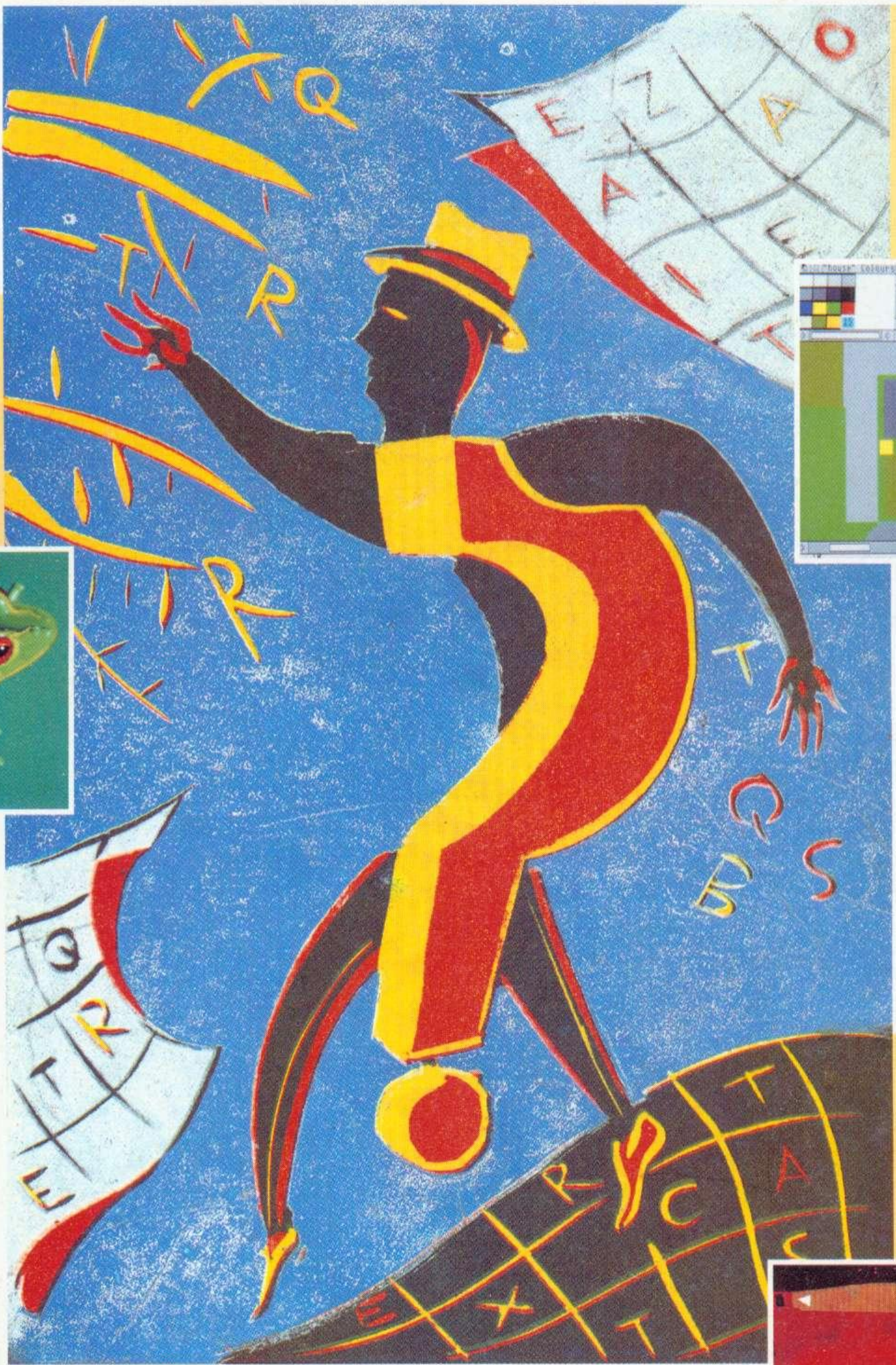
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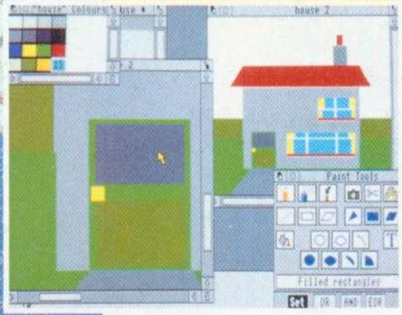
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TRIAL OFFER

Cut-down version of program (player v player only) available at £2.95 to enable you to experience the graphics. This is completely refundable against purchase of the full game.

AUTHORS

If you have written or are writing Archimedes software of commercial standard and are seeking a Publisher please write to Bob Simpson at the address given, preferably with a working sample of your program.

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'Mastering the Wimp' – series on Wimp programming
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NEWS

ARC ENTERS INTO WORLD OF 'VIRTUAL REALITY'

THE 10TH IMAGINA festival for computer graphics, held recently in Monte Carlo, showcased the latest developments in 'virtual reality' (VR), some based on the Archimedes, *writes Mat Tizard.*

For the uninitiated, a VR system allows the user to interact with a computer-generated environment. This is achieved through wearing various sophisticated devices, such as a stereoscopic headset, or a 'dataglove'. By a turn of the user's head, the computer makes the necessary calculations and then displays, to both eyes, the new views which correspond to that movement.

Recently, tactile feedback sytems have also been added. This means the user can actually 'feel' any objects picked up within an artificial environment. This is because the computer can actually stimulate the nerves in that person's fingertips.

Of course, all this requires phenomenal computing power to work at a convincing speed, and until now only very expensive parallel computers, or dedicated graphics systems, have been able to meet the challenge. The cheapest of these is still around £20,000.

Recent developments utilising the power and speed of the Arm chips have tried to undercut this. At a conference in London late last year, three Archimedes-related developments were announced. David Fell is the head of a Cambridge-based team which has developed some home-made custom hardware, using two Archimedes 540s.

They are using two small LCD (liquid crystal display) screens which mount in a helmet to give the illusion of 'being there'. The screens have RGB inputs and a resolution of 720 × 200 pixels (which is about as good as the very expensive systems), with the two Arcs communicating through their serial ports. All the 3D modelling software was developed in-house and a working demonstration of the system is expected in soon.

The sharp eyed amongst you will have noticed two Archimedes in an item concerning VR on *Tomorrow's World*, as well as graphics from a flight simulator developed by Simis, the team behind *Interdictor*. The the two computers are being used by Super X, now a subsidiary of Rediffusion Simulation, to investigate low-cost simulation. Dave Payne, from Simis also confirmed that the company is working on a VR system which will eventually utilise Arm technology.

BETTER GRAPHICS

THE PC ATS Graphics enhancer from the Serial Port is a single-width podule designed to enhance the graphics capability of the Archimedes.

The podule only needs a simple dealer upgrade to the motherboard of the Arc and will work with the 310, the 400/1 series and the A3000.

The graphics enhancer features 256 colours available in the desktop, in resolutions up to 768 × 288 on a standard monitor, and up to 832 × 328 on a multisync monitor.

Supplied as standard are crystals for 32, 36 and 25.175 MHz, with software support for all the standard Atomwide VIDC enhancer modes, the Computer Concepts extended modes for *Impression*, and the new VGA modes on the A540.

The enhancer is priced at £193. Contact QD Enterprises Ltd on (0243) 531194 for further details.

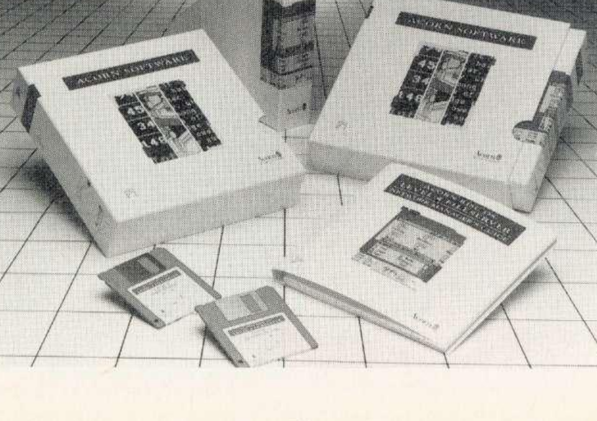
FILESERVER READY

ACORN'S new *Level 4 Fileserver* software, previewed in *BAU* last December, was unveiled at the recent BETT 91 show.

Designed with the networking needs of schools in mind, the software (shown below) enables any Archimedes computer to act as a fileserver. It allows groups or classes of networked Acorn computers to share resources, such as datafiles, CD-Rom discs and applications.

Also included is an advanced printer spooler, which can support multiple printers and Risc OS management software that simplifies day-to -day setting up.

For further information, contact Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Tel: (0223) 245200.



NEWS IN BRIEF

● **DOING** anything on Sunday April 7? Well, the open day at Watford Electronics could be well be worth a visit.

Following the success of the open days before last Christmas, Watford decided to meet public demand for a Spring-time show.

Apart from a wide range of currently available products, you can also expect to see Watford's new SCSI cards with large hard drives at what are promised to be 'very low prices'. There are also rumours that a new game will make a first appearance.

The open day times are 10am to 4pm. Watford Electronics is at 250 Lower High Street, Watford WD1 2AN. Tel: (0923) 33642.

● **ACORN** looks set to take centre stage at the Spring Computer Shopper Show at the Alexandra Palace in London (from May 10 to May 12).

Market research at the pre-Christmas show revealed that up to one-third of the visitors were either existing Acorn users or intended to purchase an Acorn machine in the future.

The A3000 was the most popular machine, according to the statistics, followed by the Archimedes and the Master.

Contact Acorn Computers on (0223) 245200.

● **IF YOU** want to convert those Archimedes sprite files into TIFF or other image formats, you need an image format conversion utility.

X-Image is a simple and flexible program for PCs that allows conversion of images between different image formats.

TIFF and the formats used by many scanners, image analysers and electron microscopes are supported and additional formats can be added as requested.

The program supports Acorn sprite files in MS-Dos format (via PC Access) and these can be converted to any other supported formats, including TIFF.

X-Image is available at the nominal price of £10. For further information, contact Foster Findlay Associates on 091-273 1111.

● **THE SCOTTISH** Schools Equipment Research Centre's graphics library is now too big for one disc and has been split into two – Science and Technology. Upgrades are available for £7.50. Contact SSERC on 031-668 4421.

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SCSI NEWS

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PRICE Breakthrough



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SNAPSHOT

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Snapshot allows the Archimedes user to digitise pictures in colour and realtime, using standard Video equipment.



You can input via a Colour Video Source (PAL), including Camcorders, Video Cassette Recorders, and TV Tuners.

Snapshot is a full 12 bit digitiser with an enhanced real-time display. Sprites can be saved at a rate of up to 84 per minute, or raw image data can be processed with !Enhance (supplied with package).

SNAPSHOT £339.00 PLUS VAT — NEW PRODUCT

NEW Snapshot Software (upgrade) Now Available for the Colour Converter and Hawk V9 **£49.95 PLUS VAT**

Contact your local dealer for further details about all Lingenuity Products.
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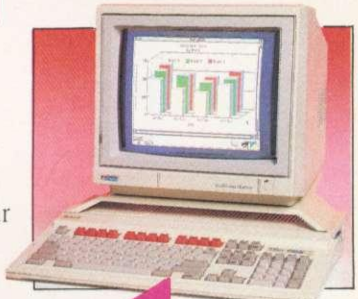
HOTLINK PRESENTER

TALKS TO PIPEDREAM 3

For the first time, two Acorn applications can communicate with each other in real-time in the RISC OS environment.

HotLink Presenter includes all the features of Presenter II (the professional graphics programme which enables you to present your data graphics in bar, pie or line format) with the additional benefit that it can be updated automatically from Pipedream 3.

Updates are available for existing Presenter II and Presenter users, as well as site-licences for multi-station installations.



HOTLINK PRESENTER £49.95 PLUS VAT — NEW PRODUCT

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You've heard about Presenter Story - well now its available!

Presenter Story is a revolutionary software package that enables you to create your own presentation on a work-station and project it into any of the following:

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Use your Archimedes or A3000 for that important presentation. You can change your presentation at a stroke in a few seconds - no more last minute panics getting new slides or acetates made. Presenter story is ideal for sales presentations, corporate presentations, training programmes, internal departmental presentations, or home or studio video application.

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LANDMARKS PROGRAMS SUPPORT SCHOOLS' SERIES

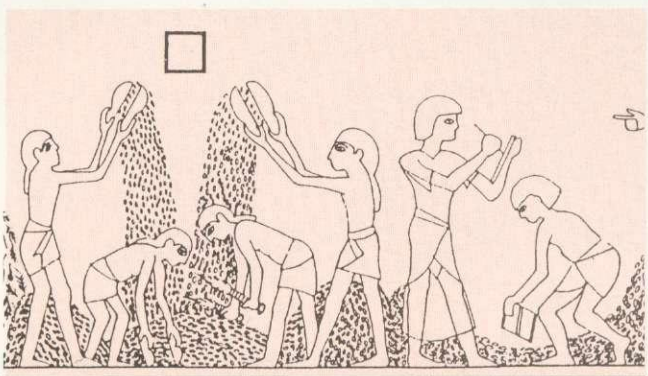
LONGMAN Logotron has released the first two programs in the *Landmarks* series, designed to support the BBC TV schools' television series of the same name.

Called *Landmarks – Egypt* and *Landmarks – Second World War*, the programs are part of a publishing schedule being jointly undertaken by Longman Logotron and the BBC. Further titles in the series (on the Rainforest and the Victorians) are to follow,

With the *Landmarks – Egypt* software, pupils can communicate directly through the computer with a 'child' living in Egypt around the year 1250 BC. This imaginary host leads users through an Egyptian village and 'answers their questions and helps them to unlock the sectrets and excitement of history'.

The program is designed to produce pictures of places and objects mentioned in the dialogue, and 'events' take place while the pupils are using the program.

Landmarks – Second World War works on a similar basis, except that the location is Somerset in 1940. There is a variety of scenes within the program, including an air raid and the discovery of an unexploded bomb in the school playground.



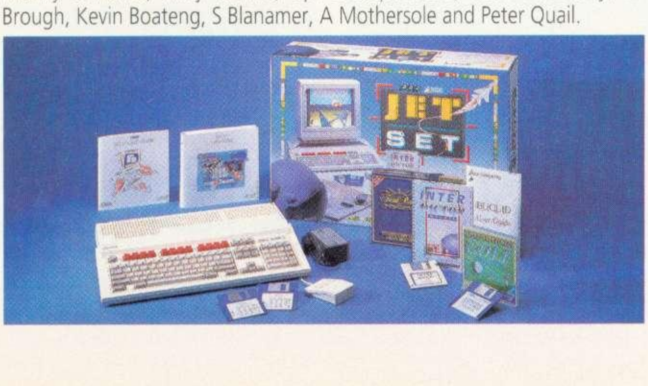
HIEROGLYPHS ABOUND IN LANDMARKS – EGYPT

Both simulations, although designed to complement the TV series, can be used independently. Both have a vocabulary of over 800 words and there are more than 60 different locations to visit and over 70 different people and objects with which to interact through the keyboard, using natural language.

The *Landmarks* series is available for the Archimedes and costs £21.85. Details from Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.

JET SET WINNER

REMEMBER our competition to win an exciting A3000 Jet Set package from ZCL? Well, the entries flooded in and we now have a winner. Congratulations to Jean Shields of Belfast for answering the questions correctly and coming up with the tie-breaker phrase: 'I would like to fly the Jet Set because ... the higher you set your sights, the more exciting the journey'. The answers were: 1. 1903. 2. Twice the speed of sound. 3. Golf. Runners-up who each win a copy of *Superior Golf* are: Hugh Jones, Manny Galitzine, Holly Walker, Cpl C Stephenson, Kevin Wheatley, M Brough, Kevin Boateng, S Blanamer, A Mothersole and Peter Quail.



EMR MUSIC UPGRADES

ESSEX-BASED music software house, EMR, has announced a new upgrade to *Studio 24 Plus* version 2 and *MicroStudio*.

The upgrade is good news for guitarists, since it will feature the first ever autoprint guitar chords, which can be transposed instantly from any chosen track.

The company has also released *Storybook*, a new package for youngsters to create their own stories with sound effects and animated pictures. Themes include a farm and a spooky castle.

For synthesiser fans, the new *Dreamwave* program provides the first complete synthesiser for the Archimedes, using mathematical waveforms to create original sounds for your computer, emulating techniques only found previously in very expensive synthesisers.

To edit the voices of a Midi keyboard or synthesiser, EMR has also developed the new *Orpheus* voice editing suite, which is compatible with the Roland MT32/CM64, Casio CZ and Yamaha PSS keyboards.

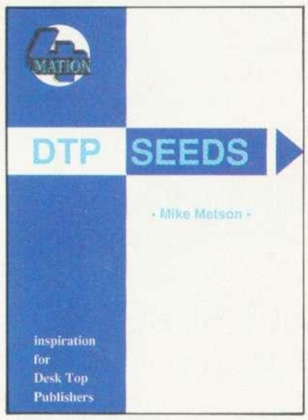
For details of these and other music utilities and programs contact Mike Beecher, EMR Ltd, 14 Mount Close, Wickford, Essex SS11 8HG. Tel: (0702) 335747.

SOWING SEEDS

IF YOU don't want your desktop published documents to look like...well, desktop published documents, then a new book just released might help.

Written by Mike Matson of 4Mation, *DTP Seeds* asks the reader to step back from the technicalities of points and picas and look at – the real thing. He encourages the reader to look at books, magazines, even train tickets and study the overall design – then 'adapt' design aspects.

The books costs £8.45 and is available from: 4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.



LISTEN TO A PEP TALK

IMAGINE typing into your Archimedes and then listening to the machine saying those words back to you...

That's the principle behind *SpeechSystem*, the first software-based speech system for the Arc/A3000.

Designed by PEP Associates of Cambridge, the system translates English text into speech by using phonemes as the basic building blocks.

Included are applications which will read text files, vocalise any text you type onto the screen and vocalise interactive help provided by other applications.

For further details, contact PEP Associates, 55 St Paul's Drive, Chatteris,Cambs PE16 6DG.

NEWS

NEW 3D CHESS GAME FROM MICRO POWER

BUDDING chess champions can now harness the power of the BBC A3000/Archimedes to a 3D version of this popular board game.

Micro Power – the Leeds-based company with over 70 programs in the BBC micro market – has just released *Chess 3D* for the Archimedes and A3000 computers.

The display is a single screen presentation with 3D graphics using shading and vanishing point perspective. Board rotation can be at any point in the game and an additional icon-type board allows quick moves to be made.

Moves and responses are listed in a window, enabling a review of the game in progress. Options include player versus computer, player versus player and computer versus computer. A book of standard openings is available, which players can add to as required.



PIECES COME TO LIFE IN 3D

Learners can 'cheat' by taking back moves or even changing sides with the computer. A part game can be set up to aid analysis of particular problems. All moves are validated and the program incorporates castling and *en passant*.

Chess 3D costs £20.90 including postage and packing and it is available from: Micro Power Ltd, Northwood House, North Street, Leeds LS7 2AA. Tel: (0532) 458800.

If you'd like to try before you buy, a cut-down trial version is also available at £2.95.

MAD MARCH PRICE-CUTS

ACORN has just released details of educational price reductions of up to £200 on two of its computer systems during March.

The Archimedes A420/1, with 2Megabytes of Ram, a 20Mb hard disc and monitor, will cost £1162 – the equivalent of £199 off the normal education price.

A BBC A3000 computer, complete with Acorn colour monitor and stand, will cost £745 – a saving of £70 off the normal price to education.

Acorn is also providing three vouchers giving reductions of up to 50 percent off specially selected software packages for each system sold to schools during March. This could represent savings of up to £350 off the normal purchase price of the software.

For further details, contact Acorn Computers Ltd, Fulbourn Road, Cherry hinton, Cambridge CB1 4JN.

NEWS IN BRIEF

● **ORION** Computers Ltd has announced two new releases. The Clipart Collection Volume 1 from the Graphics Factory includes 5Mb of clipart, comprising over 350 mono images compressed onto four discs. The topics range from cartoons to transport, and the set costs £23.

The Orion TV modulator gives near-monitor quality through a standard TV. The modulator needs just two connections to be operational and is said to be the first to allow sound through the TV speaker. It costs £74. Contact Orion on (0772) 623000.

● **ACORN** has followed on from recent research figures – which showed that 50 percent of computers shipped to schools in 1990 were Acorn systems – by announcing that the company is now the leading supplier of Risc-based computers to the UK market.

Estimates by Dataquest show that over 55,000 Acorn units were shipped throughout Britain last year, of which 75 percent were BBC A3000 machines. This is now claimed to be the most popular computer in UK schools and the fourth most popular personal computer in the UK.

Over 110,000 Risc-based computers have been manufactured by Acorn to date.

● **MEANWHILE,** those who thought that the amount of educational software in the Acorn market was limited should look at the company's new directory. It is packed with over 1100 items of educational software items, covering a wide range of applications. Copies of the Acorn Educational Directory are available from dealers at £4.95 each.

● **PURCHASERS** of Microvitec's 1431MS4 and 1451MS4 monitors will reveive a £10 voucher with each monitor, which can be redeemed against their next purchase of a Cub 3000. The latter has been specially developed for the BBC A3000. Contact Microvitec on (0274) 390011.

● **FINALLY,** if you think your copy of BAU looks slightly different this month, you're right. We have updated the design to make it a brighter and livelier read. This is also the first issue produced entirely on an Archimedes-based desktop publishing system. You can tell us what you think in our special reader survey next month.

BIG SCREEN DEBUT

TAXAN is to launch two new large screens at the forthcoming *Which Computer Show* at the end of April.

The Ultravision 1095 is a 20in ultra-high resolution monitor fitted with a Sony Trinitron CRT, capable of displaying up to 1600 × 1200 line resolution. It incorporates a microprocessor-based image control system with LCD (liquid crystal display), allowing the user to preset picture definitions for a variety of screen modes.

For graphics, Taxan's Multivision 875 is a new 17in FST multi-scanning monitor displaying images 1024 × 768 line resolution.

For further information, contact: Taxan (Europe) Ltd, Taxan House, Cookham Road, Bracknell, Berks RG12 1RB. Tel: (0344) 860981.

● The *Which Computer Show* takes place at the Birmingham NEC from April 23 to 26.

CITIZEN SUPPORTS ACORN

CITIZEN printer sales into schools have apparently soared in recent months. In particular, sales of the company's colour driver, designed to work with the Archimedes range, have helped establish colour printing firmly on the curriculum.

The driver allows colour output from all Risc-based Acorn machines, from the BBC A3000 to the top-of-the range A540. It can be used with all the standard packages, including *Draw* and *Paint*.

Offering a top resolution of 360 × 360 dpi, the driver has a price tag of £12 for a single user, or £60 for multi-users. Contact Citizen's response desk for further information on (0895) 72621.



DIMENSION

A3000
ARCHIMEDES
BBC B/MASTER
ELECTRON



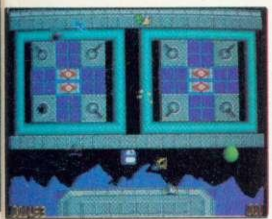
ARCADE SOCCER (RRP £19.95)
Arcade Soccer really is WORLD CUP FOOTBALL ACTION at its very best. Using an overhead view to make gameplay as exciting as possible it features everything that you could want in a football game.

WHITE MAGIC (RRP £19.95)
White Magic is a unique arcade adventure in which you control 4 varied adventurers:- A Leprechaun, Titan, Warrior and Enchanter.
You can transform between all 4 characters at will and use their much needed special abilities. White Magic is not a game for the faint-hearted; it is a fast-action game which requires fierce hand-to-hand combat and frantic weapon fire.

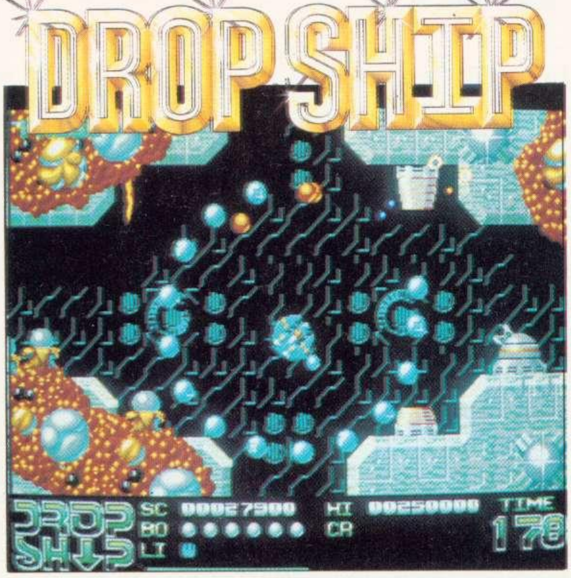
QUAZER (RRP £11.95)
Quazer is a fast action arcade style game with excellent music, sound effects and graphics. It has 11 incredibly detailed and varied vertically scrolling levels filled with the most amazing assortment of baddies you are ever likely to see.

imedes £29.95





DROP SHIP



Drop Ship is one of the smoothest and fastest arcade games you are likely to see. It features superb 256 colour graphics, 15 increasingly large and diverse stages and an excellent stereo soundtrack.

The Year is 2020.... The government proudly announces that the new fast breeder farm on the Mars colony is completely computer managed and totally safe, defended from attack at all times by a fully-automated tactical defence system.

The Year is 2030.... Earth receives a transmission from the Mars colony. The radiation seems to have affected the management software at the fast breeder farm. The defence systems have gone haywire and the whole farm is rapidly approaching meltdown. If all the reactors are not shut down the Mars colony will be wiped out.

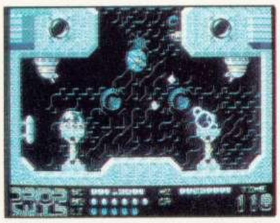
The defences include gun emplacements, artificial gravity generators, sporers and hoards of deadly aliens. What is needed is a craft which is supremely manoeuvrable, capable of great speed and possessing awesome fire power, and a pilot of extraordinary bravery to fly it. The craft is the Drop Ship. The pilot is you.

"A brilliantly addictive game which really makes you want to barricade yourself into a room for a week in order to finish it.... The graphics and animation are really superb." **BBC Acorn User, Jan '91**

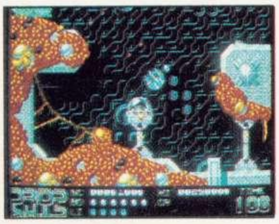
"Compared to both Rotor and Caverns, this game has to be tops. The gameplay is even more difficult than both and the graphics and sound far better." **Risc User, Dec' 90**

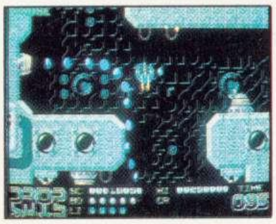
"Drop Ship is very arcade-like, with excellent graphics, the smoothest movements in town, nice sound effects and a good short demo." **Archive, Jan '91**

Price: A3000/Archimedes £19.95









BREAK 147



By any measure snooker is one the most popular sports in the world today. Break 147 has been precisely designed exclusively for the A3000 and Archimedes computers to be as close as is possible to the real game itself.

Break 147 is a full 3D snooker simulation with superb solid graphics and brilliant digitised sound effects, speech and music. The game is controlled exclusively with the mouse.

It features incredibly realistic interaction between the balls and precise control of the cue ball - topspin, backspin, stun, screw, drag, swerve and masse shots. You can view the table from ANY angle or distance even as the balls are moving.

All the rules are fully implemented and you can play matches (against friends or computer players), trick shots or just practice. You will not only be able to replay your last shot but you can also replay whole frames and move in and around the table as you watch it. Highest breaks are saved automatically to disc.

You can even create and edit your own tables so you can design your own trick shots or set up your preferred practice positions. A manual is supplied with each game which gives the fascinating history of snooker and all the rules and instructions required to play BREAK 147.

You will find that the game plays as if you were on a real snooker table with all the attendant features to take care of, but with a lot of the tedious parts - such as resetting the table, respotting the balls and scoring - maintained by your computer.

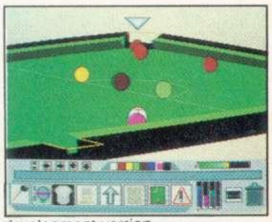
Win a Superb Engraved Trophy
This unique competition allows everyone who obtains a break of 100 or more to win a superb engraved snooker figurine on a solid marble base.

There's also a superb 16" trophy (to be engraved with the winners name) which will be awarded to the first entrant to achieve the maximum break of 147. Full details and entry coupon are included with the game.

RELEASE POSTPONED
Expected new release March - May '91

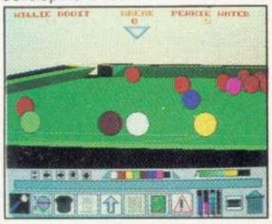
Price: A3000/Archimedes £24.95
Anticipated Release Date: Mid November '90





Screen shots from early development version





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RESEARCH INTO CD-ROM

SCHOOLS minister Michael Fallon used the opening ceremony of BETT 91 to announce a Government-funded investigation into the potential uses of CD-Rom in education. £500,000 has been earmarked for the scheme and NCET has been contracted to produce support material.

The minister also highlighted laptop computers and interactive video as technologies for the future.

He called on manufacturers to produce a robust, cheap portable with a long battery life for use in schools and he promised a thorough pilot of IV in 1992/93.

He summed up by saying, 'Stimulated by a £75 million Government programme over the last three years, we have seen development of IT in schools in this country as good as anywhere else in the world.

'In the coming year we shall be spending £30.4 million. I look forward to the continued co-operation between all those involved to enhance the education of all of our children.'

The CD-Rom support materials, which are being prepared by NCET, consist of four new booklets and two reference guides, designed to help teachers get started.

The booklets address the use of newspapers, encyclopaedias, NERIS (educational resources) and ECCTIS (courses). They will be ready by Easter and information on how to get hold of them is available from NCET.

CD-Rom, in particular, had a high profile at BETT with more hardware manufactureres demonstrating the relevant CD-Rom drives and accompanying software. The most popular information was undoubtedly annual sets of quality national newspapers.



MINISTER MICHAEL FALLON SPEAKING AT BETT 91

BOOK OF SOFTWARE

Another NCET activity which has recently found form in print is *Educational Software* – a directory of currently available software for primary and secondary education. This comprehensive publication lists 5000 programs suitable for use in primary and secondary schools but also in sixth form and further education colleges and with special needs students.

Each entry gives you the program's title, hardware suitability, producer, date and place of publication, any materials supplied with it, price, curriculum applicability and age range.

The criteria for inclusion in the catalogue, which has been compiled from NCET's detailed database of educational software, is that a program will run on any piece of hardware commonly installed in schools. This, of course, includes Acorn machines, and software for the BBC and Archimedes ranges is very well represented.

The book is structured alphabetically by title. However, if you don't have a particular package in mind, the sensibly organised subject index lists the names of, say, primary maths packages or geography programs. There is also a section of suppliers' names and addresses.

Regular updates are essential for a directory such as this and new editions are promised for the future. There is, of course, always the possibility that the volume will eventually become available on CD-Rom. *Educational Software* is a 400-page, large format paperback. It costs £18, plus £2.50 postage and packing, and can be ordered from J Whitaker and Sons Ltd, 12 Dyott Street, London WC1A 1DF.

Any software company that finds its packages are not included in the directory (and there are one or two of the small ones that don't appear) should contact NCET's Coventry offices.

WHAT A COMMOTION

The trusty and familiar Barnet Box, ideal for control technology activities, has been completely redesigned and now goes under the name of the Commotion Control Box.

In line with modern control practice, the input and output lines have swapped sides to give a logical input-process – output situation.

New 4mm terminal posts have been installed on all inputs and outputs, which will accept 4mm or 2mm plugs or bare wires. Input and outputs have also been provided with indicator LEDs. The angle of the front panel has been adjusted for ease of access and better legibility.

The Commotion Control Box is priced at £179, which includes Beeb/Master software, input sensors, output devices, all necessary leads and a manual. Commotion can be contacted at Redburn House, Stockingswater Lane, Enfield EN3 7TD.

Lisa Hughes

NEWS IN BRIEF

● **PENDOWN** Outline Fonts is a recent release from Longman Logotron. It supports Pendown, Magpie or indeed any Risc OS application that exploits the Outline Font Manager. The newly available fonts include a number of wild and wacky typefaces, plus Braille, Morse and Semaphore (cute little people waving flags). The disc costs £18 and can be obtained from Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.

● **TEACHERS** and advisors comments have been taken on board in an update of NStore, the National Curriculum record-keeping package from HS Software. The new version makes transfer of class data between discs easier and it has improved ranking and alphabetical sorting. Existing NStore users can upgrade to NStore 2 by returning their original program plus £5. HS can be contacted at 56 Hendrefolian Avenue, Sketty, Swansea SA2 7NB.

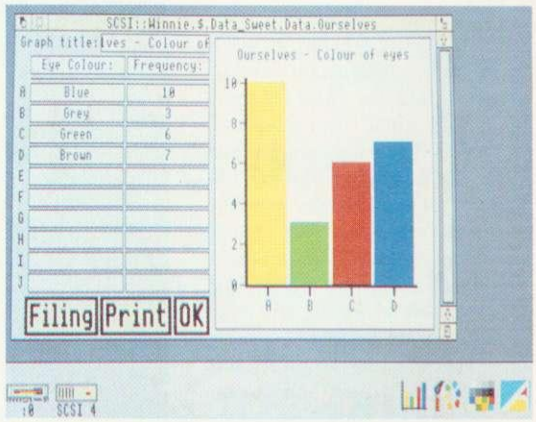
● **MICROS** and Primary Education, better known as MAPE, is holding its annual conference at Jordanhill College in Glasgow, from 3 to 5 April. The event's title is IT's Working For Me, and delegates will have the opportunity to experience a wide range of applications currently used in primary schools. To attend, contact Anne Foster, Inverkeithing Primary School, Roods Road, Inverkeithing, Fife KY11 1NP.

● **USERS** of Campus 2000 can attend their own conference, from 2 to 4 May, at Eaton Hall International Conference Centre, Retford, Nottinghamshire. Advisers, teachers and support staff are invited to attend, with the main aim being to explore the potential curriculum uses of on-line systems. The delegate fee is £180, which includes accommodation. Further details from Sharon Thomas at Campus 2000, PO Box 7, 214 Grays Inn Road, London WC1X 8EZ.

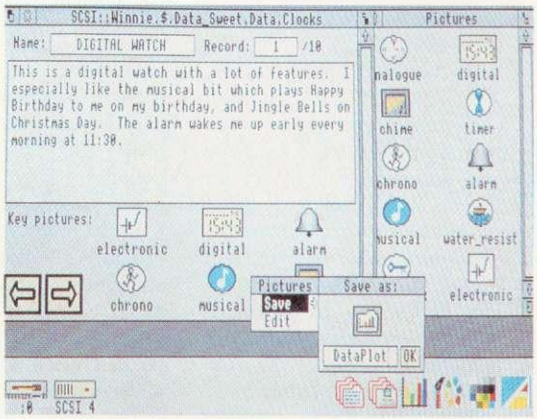
● **A NEW** edition of a directory containing information on over 750 films and videos, for loan, hire or sale, has been published by CFL Vision. Many of the titles are suitable for use in an educational context and some titles can even be borrowed free of charge. The directory costs £5, and is available from CFL Vision, PO Box 35, Wetherby, Yorkshire LS23 7EX.

DataSweet

DataSweet is a Risc OS desktop package especially written to develop children's data handling skills. Each application may be used progressively from basic graph drawing to full database searches and spreadsheet calculations. Each application has been written to facilitate delivery of the National Curriculum and its guidelines on data handling.

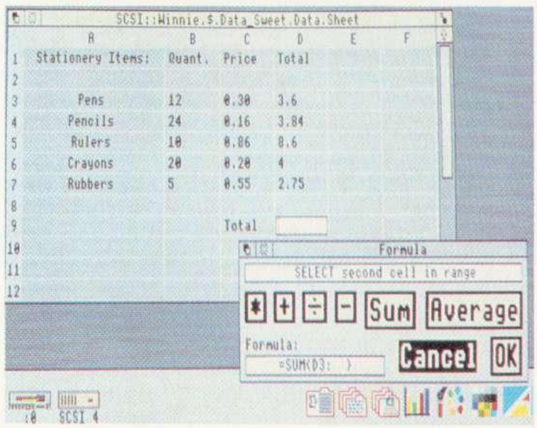


DataPlot is a simple to use graph drawing program, that integrates with the rest of the suite by importing data files created by other applications and displaying the information graphically.



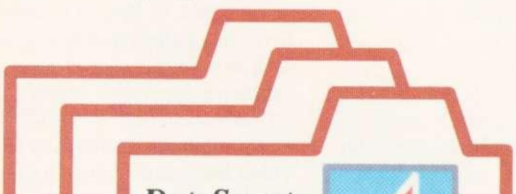
DataCard is a card index database that allows text to be entered into a free text field, with up to 6 keywords. The keywords can be searched on and exported to DataPlot.

DataPick is similar to DataCard, with the added feature of 'key pictures' instead of keywords. New pictures may be imported, by dragging into place from their windows.



DataFind is a more sophisticated database which introduces the concept of fields within records. Files created in DataCard may be imported into DataFind.

DataCalc is an introduction to using spreadsheets. Columns of data may be imported from all the other applications in the suite, and be exported to DataPlot to obtain graphs and charts.



For further information, contact: Hampshire Microtechnology Centre, Connaught Lane, Portsmouth, PO6 4SJ. Telephone: (0705) 378266
E-mail 01:YDO059

- *Single School Site Licence: Secondary £80, Primary £30*
- *Area/Group Site Licences: Secondary £30, Primary £6*

COMMUNICATIONS

BBS ON THE BBC MICRO

ONE advantage of writing a comms column like this is that I can keep in touch with readers directly. To help me do this, I now have my own bulletin board up and running.

With the exception of a few hiccups here and there – crashing discs, mailboxes disappearing and files getting lost – my faithful old Beeb seems to enjoy its new task.

I've put a number of frames up, covering such topics as music, video and astronomy, along with Beeb and Archimedes areas.

One of the main reasons for becoming a Sysop (system operator) was to provide readers with a simple method of uploading any files for text directly to me.

As I'm a newcomer to running a bulletin board, I will also be able to offer hints and tips and highlight any problems I get along the way.

All this should help you if you are thinking of setting up your own bulletin board, and I'll be able to give you a few 'inside' stories, as well as some practical advice, on what goes into running a BBS.

Feel free to give the new board a ring on (0705) 871531 (viewdata 7E1 or scrolling 8N1 for uploads only).

NEW MODEMS

Pace Micro Technology has just launched two new modems, following a lengthy break from the comms market since the introduction of the company's popular Linnet range.

The Ultralink Quad and the Ultralink 32 modems both support all speeds up to v22bis (2400/2400) and offer v42 and MNP error correction. In addition, the Quad 32 also includes CCITT standard v32 (9600/9600). This, coupled with MNP5, can give an effective data transfer speed of up to 19200 bps.

Unlike most conventional modems, the Ultralink has a comprehensive LCD panel on the front, which is easier to read and offers better clarity



TASKdata AND TASKansi FROM I JONES

than conventional LED indicators, and is even better than Pace's own earlier Series 4 modems.

A clear readout of connect speeds, Rx, Tx and error correction in use is given. Of course, such luxury doesn't come cheap – the Ultralink Quad costs £499, while the Ultralink 32 comes in at a rather hefty £1033. Pace Micros can be contacted on (0274) 532000.

COMMS GROWTH

Thanks to a few dedicated comms boffins, the range of Archimedes multi-tasking comms software seems to be rapidly expanding.

One such enthusiast is Mr I Jones, who has just enhanced his popular *TASKansi* and *TASKdata* applications.

TASKansi is a comprehensive Ansi, VT52 and VT220 emulator, whereas *TASKdata* is for viewdata use, such as Prestel and SID.

Both applications boast an impressive list of features. *TASKdata* now supports CET and Kermit download protocols, along with viewdata editing facilities.

A simple script language is even provided for within each of the packages.

For further details, including cost, you can contact I Jones at 7 Bruntsfield Avenue, Edinburgh EH10 4EZ

A simple Risc OS terminal emulator is also available from the, unusually named, Zombiesoft. Called *Term*, it is available to download from most bulletin boards. It is fully multi-tasking and copes with all speeds up to v32 with a selection of word settings. It is fairly basic with no upload or download facilities, but should be ideal to use on a Lan or within colleges, where connecting a remote Archie to a mainframe system is required.

COMPETITION!

This month I thought I'd run a simple competition and I'm delighted to be able to offer a copy of the very latest comms package, *ArcTerm7* (see the review on page 118), to the lucky winner.

All you have to do is put the answer to the following simple question on a postcard and send it to the address below. The author of *ArcTerm7*, Hugo Fiennes, is well known for running a large Archimedes bulletin board – what is its name?

The closing date for entries is April 30 1991. The first correct answer pulled from the hat wins the prize. If you can also give me the telephone number of the bulletin board, I'll throw in an extra disc full of sound samples to accompany the package. Good luck.

Paul Vigay

NEWS IN BRIEF

● **The 1991** DataComms book is now available, listing over 5000 comms sites, together with the installation equipment and name of the comms manager. It is aimed mainly at business users, and costs nearly £80, so I doubt if many home hobbyists will find it useful. However, those working in a comms environment will find it useful for checking out fax, network and communications systems around the country. For more details call 071-927 9247.

● The Serial Port has recently upgraded its ArcTerm7 package to give extra support to Campus 2000 users, and now includes 132 column modes. The Serial Port can be contacted on (0243) 531194 (voice). The company also hopes to provide a hot-link to Genesis II from Oak Solutions. This will allow you to call up an on-line system, extract some data and log-off, all from within a Genesis application.

● I have discovered yet another bulletin board which will be of interest to Acorn users. Power-House BBS runs on a PC system (aggh!) but does include loads of files for both the Archimedes and Beeb computers. There are various Acorn-specific conference areas, one aimed specifically at Archimedes demos, providing the latest news and comments. The Power House is on (0829) 782676 and supports scrolling access at any speed up to v22bis.

● For those users who want a quality modem and don't mind paying for it, MultiTech Systems has just announced a new 'MultiModem v32'. Including virtually every feature you could think of up to MNP level 5, v32 and remote configuration, it weighs in at £1086.75. If you have an extra £50 to spare you can go for the optional v42 error compression version. More details on (0932) 351674, and for a limited time you can take 20 percent off these prices to give a cost of just over £750 for the basic machine.

● Do you run a bulletin board? Or do you have an axe to grind with someone who does? Or maybe you want to praise them. In any case, all communications are welcome. Please contact: Paul Vigay, BBC Acorn User, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Micronet 919992492.

If you haven't seen Longman Logotron's 1991 catalogue, chances are you aren't making the most of your school's software budget. Consider these brand new programs for the Acorn Archimedes:

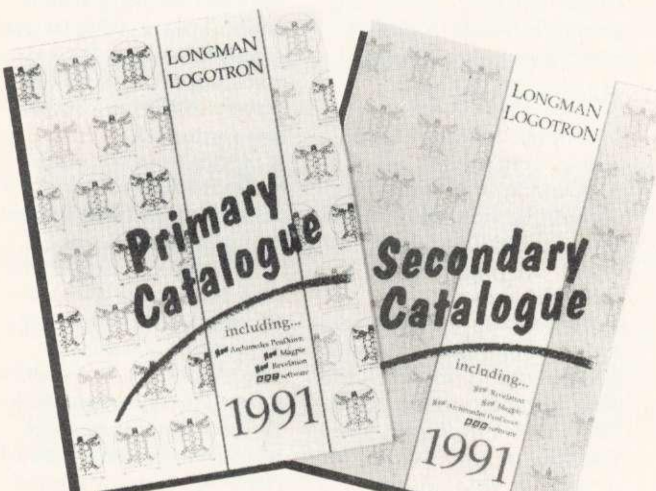
- **Pendown**, a word processor designed specifically for education, with a range of new features offering control as well as freedom
- **Revelation**, a powerful image processing program which enhances classroom creativity across the curriculum.
- **Magpie**, a multi-media publishing program which enables children to draw on a wide range of sources to create flexible and exciting projects.

Individually or in combination, these programs are accessible to 6 year olds, yet will challenge 16 year olds and open an expanding universe of learning in support of the National Curriculum.



SHARE OUR VISION

If you want to know more, fill in the coupon below, and we'll send you our new 1991 catalogue plus free vouchers for up to £50 worth of Longman Logotron software.



SEE THE POSSIBILITIES

LONGMAN LOGOTRON

Longman Logotron
Dales Brewery
Gwydir Street
Cambridge CB1 2LJ
Tel: (0223) 323656
Fax: (0223) 460208

Please send me my free copy of the 1991 Longman Logotron catalogue, and vouchers worth up to £50.

My interest is in
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AU 4-91 SOV

SAVING THE ENVIRONMENT

THE PC doesn't have the flexible configuration capabilities of the Arc or Master. When you set up your emulator correctly for one use, you can often fall foul of the requirements of another.

You can, of course, reboot the machine between each application, but you still have the problem of configuring it by hand.

The alternative is to use a system of CONFIG.SYS and AUTOEXEC.BAT files, which can be kept on separate floppies, or in a directory of your hard drive. On floppy, all you need is a separate system disc for each of the environments you want to set up and reboot with that disc in your boot drive.

On a hard drive machine however, things are a little more complex.

The system I use involves a series of batch files named after the environments I want to set up: DOS.BAT, GEM.BAT, WINDOWS.BAT, NOEMS.BAT, etc. Each of these batch files copies corresponding SYS and BAT files to the root directory, renaming them CONFIG.SYS and AUTOEXEC.BAT as they go.

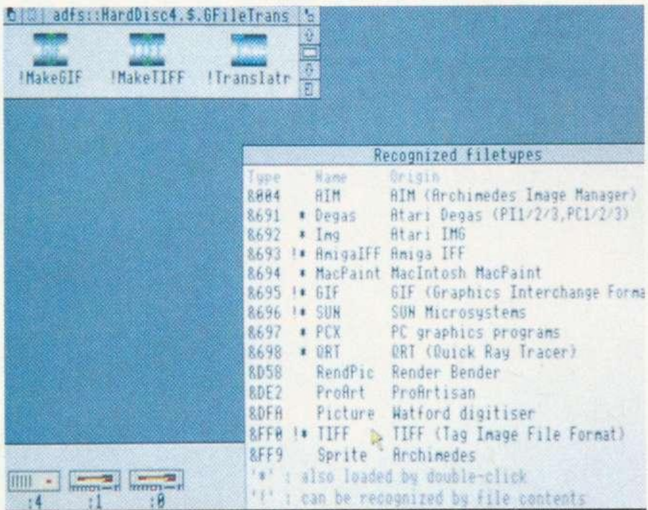
Making a call to a small machine-code utility called *Warmboot* then reboots the PC emulator and executes the newly-copied files, thus reconfiguring the environment. *Warmboot*, or a variant, is available from most PC Public Domain libraries.

This system of reconfiguration has an added advantage. Any alterations made to CONFIG or AUTOEXEC by newly-installed applications can be removed simply by overwriting the files from the bank of copies.

DR-DOS

Whereas Acorn used to supply MS-Dos 3.2 with the Archimedes PC emulator, The Learning Curve package comes with version 3.41 of DR-Dos, a rival operating system from Digital Research.

You can purchase DR-Dos 5 for any Arc by mail order. It is also available from many PC outlets, including Software Paradise (tel: (0800) 378873).



TRANSLATOR IMPORTS MANY PC GRAPHICS

So, why would you spend about £126 on another operating system?

Well, DR-Dos has a number of good things going for it. First, it offers a number of extensions to the command line Dos users have come to know and hate – editing and recalling commands, for instance.

Under MS-Dos, f3 recalls the last command entered, and you can edit it if you can remember the obscure set of editing controls, which hark back to the days of CP/M.

Unless you are some kind of masochist, you will also appreciate *DR-DOS Editor*. As an alternative to MS-Dos *Edlin*, *Editor* is a positive wonder.

For a start, it's a full screen utility, so you don't have to specify each line – you edit by number. You do have to learn the cursor control sequences used by *Wordstar*.

DR-Dos incorporates a history and editing system using the cursor keys. Press the up-arrow key and the previous command is recalled. Press it again and the command before that comes back, and so on. You can edit the commands using the left and right-arrow keys and you can toggle between Insert and overwrite modes with the INSERT key.

WINDOWS FOLLOW UP

Neil Postlethwaite sent me a copy of the latest version of *Translator* in response to my request for a PC program for handling sprite or *Draw* images. Two utilities are supplied with the latest version to translate files to GIF and TIF formats.

Neil maintains it is better to translate on the Arc, which is faster, and that GIF and TIF are popular PC formats.

While TIF is widespread, GIF – the format used on the Compuserve network – is rarely supported in commercial software. Also, there's still no support for Arc graphics formats on the PC, which is important, if only to show a degree of acceptance of the formats in the wider PC marketplace.

Neil is obviously a Macintosh fan and makes some rather scathing comments about *Windows 3*. He should perhaps bear in mind that two million copies have been sold worldwide since the product's launch a year ago.

More new PC software is being written for the Windows platform than for any other PC. An Archimedes with an Arm 3, an EGA display emulation, 2Mb Ram and a hard disc would be able to run *Windows 3* at adequate speeds.

Simon Williams

IN BRIEF

● FOR several years, GST's Timeworks Publisher has had the budget desktop publishing market on the PC stitched up. However, last year saw the arrival of a major challenger, Express Publisher. A revised version (2) of this program has just been released by Power-Up!, the Camberley-based mail-order company. The new program offers a number of text effects not available on other desktop publishing packages, as well as landscape printing and enlarged, editable page views, which it previously lacked. Express Publisher 2 costs £183.94, or £49.58 if you enclose the cover of your current PC DTP manual! Power Up! is on (0252) 376000.

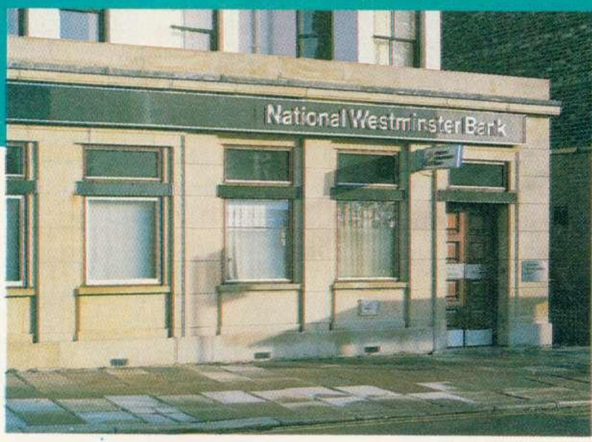
● Inkjets are coming to the fore in the printer market and the latest release from Canon, the BJ-330, promises to enhance its reputation still further. The printer has many of the features of a good laser, and it prints at 360 dpi, with the near silence now expected of an inkjet. Canon can be contacted on 081-773 3173

● Microsoft has has decided to have a share of the nice, small, Romable Dos market by writing a new version of its own MS-Dos. MS-Dos 5 will sport most of the goodies in DR-Dos, but it will also include a context switcher, letting you flip between applications in a pseudo-multi-tasking way. It should cost little and will be available this Spring from Microsoft.

● If you ever need to grab PC screens, you need a copy of Pinch and Punch. This ultra-clever utility, now in version 5, auto-detects screen mode and grabs a screen via a simple hotkey. The proprietary graphics format can be converted to the more common PCX or TIF formats using utilities supplied with the package. The software costs £30 from, Iolo Davidson, at Scrubbetts, Bagpath, Tetbury, Gloucestershire GL8 8YG.

● The Public Domain and Shareware Library has a new catalogue. Among thousands of programs listed, are three new 'theme packs', intended for new users. At £23 each (£18 each for members), packs P001, P002 and P003 contain selected programs for general purpose, business and family users respectively. Contact PDSL on (0892) 663298 for more details.

There are now three places where Acorn users can guarantee to save money.







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AU4

The Star LC-10- puts the competition in the shade.



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FOTOFILER FIX

I have a Master 128 and was very keen to use the *Fotofiler* program by Jeff Tullin (*BBC Acorn User* February 1990) for filing my collection of thousands of photographs. I was unable to get this running in spite of endlessly checking my entry of the listing, and put the disc aside.

On seeing the updated version (*BAU* February 1991), I tried to run this from the monthly disc, again with no success, not my typing after all. In both cases the errors of 'Too big' and 'Type mismatch' were reported at various menu options.

Delving into the program the problem seemed to stem from the opening of a file within PROCnewdisc, where a very large padded file is created, one's records then being entered at the end of this file.

Substituting CLOSE #file instead of CLOSE #0 in line 1520 cleared all problems and my photographs are now being catalogued by this excellent program.

I was unaware that these commands differed except that the latter (CLOSE #0) closes all files, however, this final correction will enable other Master owners not to be denied the facilities of this useful database.

Derek Clarke
Cirencester

There is a bug in CLOSE #0 on the Master 128 that caused this problem, which is rectified by using CLOSE #file. The new Rom for the Master has the bug fixed.

SCART SUSSED OUT

I would assume that Mr Alan Lewis' belief that he would be able to use his Sony TV with his A3000 via the Euro connector or Scart socket (Questions and Anwers, *BAU* March 1991) was based on information given in his instruction manual, similar to that in mine, and that he was seeking technical details of how to make the connections.

To display an RGB signal on sets using this system it is necessary to feed the individual red, green and blue signals from the computer to the relevant pins on the Scart connector, and also feed the correct control signal to the RGB status pins to instruct the TV to switch to RGB mode.

Assuming Mr Lewis' Sony TV set is similar to mine, purchasing a PAL encoder is not the only way (nor the best) of obtaining a colour picture from his A3000 on his TV.

Professor B D Josephson
Cambridge

Anybody who wishes to receive details of how to connect your A3000/Archimedes to your Scart socket please send an ordinary SAE (1/3 A4) to the usual editorial address, marking your envelope 'Scart Connections'.

MORE MANDELBROTS

Since the 'Mandelbrots in Moments' article appeared in *BBC Acorn User* (March 1988) I have on various occasions 'played' with it and found it superb – with two exceptions, 1 - Low resolution screen (mode 13) and 2 - zoom restriction.

Just recently I have purchased a multisync monitor and have played around with the Basic part of the program to produce near photographic images (in mode 21) – it does make the poor old Arc grunt a bit, but never mind.

However, the most disappointing element of the program is the restriction on the amount of zoom allowed before the picture breaks up. It has a knack of doing just this at an interesting area.

Could you ask Mr Fedonzuck to re-write the Arm code to enable us to have an infinite zoom? Then I think we would really have the definitive program for the Mandelbrot set, give or take a Cray or two!

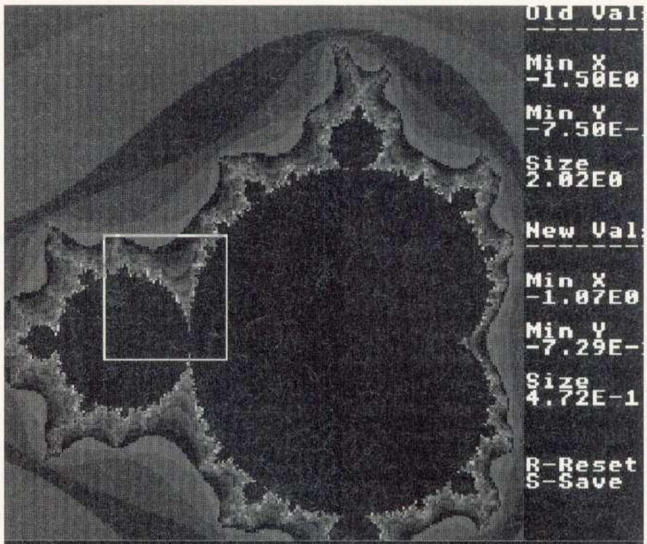
James Mansfield
Churt

The variable that restricts how far you are able to zoom in on a Mandelbrot is the accuracy of the results derived from the formula. The programs in the March 1988 issue used 32-bit accuracy to store the answers. 64-bit accuracy will obviously allow the program to do more iterations of the formula before the inaccuracy becomes noticeable, represented by the 'frilly' edges.

Of course the trade off between accuracy and speed rears its head here.

In *BBC Acorn User* April 1988 Stephen Streater sent in a 3secs Arc Mandelbrot program. Stephen also supplied a routine that did 1024 iterations and could go further into the set, but it was very slow, relatively of course!

A theoretically infinite zoom is simply not possible.



THEY MAY ZOOM ALONG, BUT NOT DOWN

PRIMARY MOTIVE

I wonder if you could let me know how to get hold of some sort of Primary (junior) schools' computer pack for a small private school. The ages I teach are eight through to 11 year olds.

Elizabeth Stott
East Lothian

There are literally hundreds of companies producing software for use with your age-group but it's difficult to recommend specific packages because it depends on what you want to achieve educationally.

However, ESM, which can be contacted on (0223) 65445, and Sherston, which is on (0666) 840433, both have deservedly good reputations. AVP Computing, on (0291) 625439, and Rickett Educational Media, on 071-223 3457, distribute a wide range of educational software. These companies will be more than happy to send you their catalogues.

Before you purchase software it is obviously much better to see it working, Sherston operates a 28-day approval service. Look out for forthcoming IT exhibitions in the pages of *BAU*.

You may also like to write to Acorn Computers to obtain a copy of the Education directory which is £4.95, see page 15 for further details.

ADVERT OMISSION

I am writing to complain about the advert that appeared in your magazine for the BETT 91 exhibition. There was no mention anywhere that this exhibition would not allow students or persons under 18 years of age to be admitted.

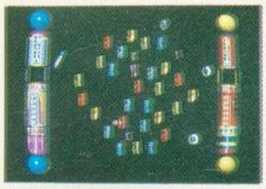
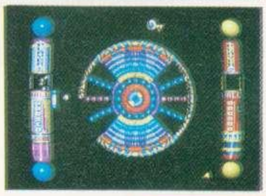
Only on the insert, in some very small print, is this mentioned.

I was very annoyed, and my son disappointed when he was refused entry, especially as we travelled all the way to London especially for the show.

Morris Jones
Southampton

The BETT exhibition is targetted at educationalists, not students, but we appreciate that this may not have been made clear from the advertisements. We are very sorry that you wasted time and money trying to visit it. We have asked the organisers to make it clear on advertising for future shows that under-18s are not admitted.

BALLARENA

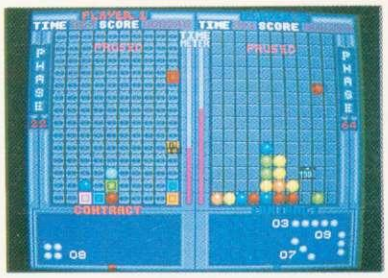
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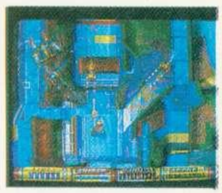
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QUESTIONS AND ANSWERS

Q My BBC A3000 has been fitted with the official Acorn 1Mb upgrade. I would now like to upgrade to 4Mb and wish to know whether you I can upgrade the present board, or whether I will have to replace the board totally.

L Gallingagh
Dublin

A **Unfortunately, the Acorn board cannot be upgraded to give your A3000 4Mb. You will have to recoup your expenses on the official board by selling it secondhand and buying a new one.**

Q I've recently purchased a secondhand BBC Master Compact and now want to start using the computer as a word-processor with the built-in *View* package.

A colleague at work who has used *View* says that I also need a printer driver to obtain a proper printout.

A Earl
Kent

A **The version of *View* supplied on disc with the Master Compact for loading into sideways Ram includes a built-in printer driver for an Epson printer. So you already have a printer driver, that will probably meet your needs.**

If you are using a nine-pin dot-matrix printer – such as an Epson, Canon, Taxan, Citizen, or Panasonic – you should experience no problems in obtaining good quality printouts with this built-in printer driver. Features like double strike, underline, italic, subscript and superscript will be available by using the *View* highlight commands.

Q Recently, I picked up a bargain piece of secondhand software that I thought would improve my use of the Master 128 for business use – Acornsoft's *OverView*. But there were no instructions available, as the previous owner had mislaid them. Can you offer any pointers?

C Vidal
Gloucs

A ***OverView* offers a means of obtaining all the *View* family of software for the BBC Master.**

It consists of all the disc-based programs – *Viewplot*, *Viewindex*, and the *View* printer drivers and a plug in Rom cartridge which holds *Viewspell* and *Viewstore*. The Roms also contain a number of useful star commands.

You should be able to purchase copies of these manuals from an Acorn dealer such as Watford Electronics. Information on the additional star commands is as follows:

***HELP provides help on *View*, *Viewsheet*, *Viewstore* and *Viewplot*.**

***WIDE ON enables more characters to be shown on the standard BBC micro screen display. It gives 106 characters instead of 80 or 53 instead of 40.**

***WIDE OFF returns to normal screen display.**

***KEEP is geared to the better integration of the *View* family. The Keeper can set up a large disc or sideways Ram file to hold the entire state and memory of the computer when you change from one *View* language to another.**

***READ is another useful command in an integrated system allowing the contents of Ascii files to be read into *Viewsheet* at a specified location.**

***RC (Read Contents) allows *Viewsheet* to read a list of slot contents from one to the other as if they were typed in –just like as if they were being merged.**

Q At work we use NCR computers and I program in C for a living. For some time I have been impressed with the talk of the power of 32-bit computers and have taken the plunge and bought an Archimedes 420/1 and would like to use it to program in C at home.

What software is available for this? Will I be able to interchange code written at home and at work between the different versions of C?

R Atkinson
Dundee

A **There is not a great range of choice of versions of the C language available for use in the native mode of the Archimedes. I would recommend Acorn's Ansi C.**

You should be able to use programs that are text based on the NCR computer, which I believe is PC-compatible. However, you will have difficulties if the programs are graphics based. Do note that the libraries will be different to those incorporated in PC versions of C to those on the Archimedes.

It will, of course, be necessary to transfer the files from the ADFS filing system to MS-Dos so that your machine in the office can read them. I would recommend you use a package like *MultiFS* from Arxe Systems.

An easier solution would be to run an MS-Dos version of C on your Archimedes under the Acorn PC emulator as 'true' compatibility will be more likely.

If you have a particular problem with an Acorn micro, commercial software or a program you are trying to write yourself, then BBC Acorn User might be able to help. The BAU Post A Problem service guarantees to give you a personal answer to your problem within 10 working days – and for just £4.
Write out your problem with as much detail as possible and, if a program is involved, include a disc or cassette. Fill in the coupon and send it and your problem along with a cheque or postal order for £4 (including VAT) made out to Redwood Publishing. If you require recorded delivery, please add the cost of this.
Please note that debugging readers' own programs or those from other magazines is a complex task and we cannot guarantee to give a full solution. Unless the problem can be spotted quickly, the Post A Problem service will only be able to make general comments.
The Post A Problem service will answer the problem and return all corresponding material received within 10 working days of receipt. If we fail to match this promise then your cheque or postal order will be returned – you just can't lose!

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To obtain disc compatiblilty between the NCR and the Archimedes you will need to add a 5.25in disc to the Arc. This won't be a problem as many of companies market a safe interface device for about £35.

The Archimedes under the PC Emulator will be able to format, read and write 720K MS-Dos discs without problems. However, if your NCR produces 360K formatted discs, you will have to set your Arc to read these, but that is well documented and will not be a problem.

Some users of the emulator prefer to format discs on the PC machine rather than the Archimedes.

Q Having just retired, I have purchased a BBC Master with money given to me as a retirement gift. I'm looking for books to support me and I really want something that may help to bridge the gap between the *Welcome Guide* and the reference manuals. Can you recommend any?

Harold Taylor
Hanwell

A **What a great way to spend your retirement present! I hope you do get to grips with computing and keep reading (what about an annual subscription?).**

I think the following books may well help. *The Dabhand Guide to the Master Operating System* by *BAU* contributor David Atherton is published by Dabs Press, price £12.95. *The Complete BBC User Handbook* by John Lockely and Douglas Tate is published by Watford Electronics.

Q At the college I work at in Hong Kong there are a number of BBC micros. I am currently teaching the principles of accounts, typewriting and commerce – do you think I could use the BBC micro to support my work?

Miss Lin Lai Chu
Hong Kong

A **I think you will find the BBC micro very useful in supporting your work as a teacher in the business studies curriculum.**

Acorn produces three Rom packages that will fit inside your computer that will be of immense value.

There is a wordprocessing package called *View*, a spreadsheet called *Viewsheet* and a datahandling package called *Viewstore*.

Your students will find these of immense value in preparing them for the work place. Although different to wordprocessing, spreadsheet and database packages for the IBM PC or compatibles, they do give a good understanding of the techniques of these three types of business software.

A most useful starter book is called *Mastering View, Viewsheet and Viewstore* by Clive Williamson. It is published by Sigma Press and costs £12.95.

I think you may also benefit from reading *The BBC Micro and the Small Business* by Simon Williams, published by BBC Soft, price £5.75.

Q My great interest (other than computing with my recently acquired BBC A3000) is word games and puzzles and I need a lexicon of English words to work with when creating and solving them.

Colin Hogben
Abingdon

A **You have probably already tried using various spell check programs with your Archimedes. But did you know that both *First Word Plus* and *Pipedream 3* have had additional dictionaries published to cover specialised words. These may be of assistance to you.**

However, I feel that you will be best served by obtaining a set of Word List discs available from Shareware Marketing of Beer, Devon. The four or five discs that make up the set contain about 250,000 words. The files are compacted using the Arc compactor which I believe *SparkPlug* from David Pilling will decompact. You will, of course, have to use the word lists under the Acorn PC emulator.

ACORN CUSTOMER HOTLINE

● In the March 1991 issue of BBC Acorn User information was given on the Level 4 Fileserver from Acorn. Although the Level 4 Fileserver package has been announced, it is not due for release until the end of March/early April at the earliest.

Please also note that contrary to the information in last month's hotline, the Broadcast Loader will not be supplied as part of the Level 4 Fileserver and will be released shortly after Level 4 as a separate item.

● We were hoping that this month we would be able to bring you some important information on SID. Unfortunately we have been unable to complete the various changes we were hoping to, and therefore details on the changes will be published in a couple of months.

● For people who wish to purchase the new BBC model B Emulator package please note that the offer will expire on March 31 1991. As a reminder the package can be purchased for £19.95 (cheques only) from: Acorn Direct, 13 Dennington Road, Wellingborough, Northants., NN8 3RL. Please see BBC Acorn User January 1991 for full details.

● When using wordprocessors with various dot-matrix printers printers, customers often have problems with printing '£' signs. In the large majority of cases on both 8-bit and 32-bit based systems using the '£' within your wordprocessor in place of the '£' will make the printer print the '£' symbol. Some wordprocessors do however automatically convert the '£' symbol into a '£' before sending it to the printer.

Note that if you are a user in education, all LEA Advisor contacts have been sent a copy of the complete package and you can contact them to be supplied with a copy of the BBC model B emulator for your school.

● Although the mice supplied with Archimedes and BBC A3000 have proven to be very reliable, it is inevitable that they will eventually begin to wear out. The mouse is one of the very few mechanical parts of the system and is extremely heavily used. Acorn Approved Dealers are able to supply various spares for the mouse such as cables for both Digimouse and the Logitech mouse, and also spare balls and retaining clips for the Logitech mouse. Please note that in a lot of cases when people think their mouse has become faulty it does in fact only need cleaning.

Full instructions on cleaning the mouse ball and the rollers can be found in either the User Guide or Welcome Guide supplied with the computer.

● In both 300 series machines (fitted with an Acorn backplane), old 440 systems and all 400/1 series machines, the fan has a filter to extract dust from the air. This filter should really be replaced anually to ensure a smooth throughput of air. The spare fan filters can be purchased from your Acorn Approved dealer. Full instructions on replacing the filter can be found in either the User Guide or Welcome Guide supplied with the computer.

● Earlier versions of the PC emulator ignored the floppy disc drive step rate values, which are stored in CMos Ram, and controlled the FDC (floppy disc controller) directly. On the BBC A3000 and Archimedes 400/1 series machines this resulted in excessive noise from the floppy disc drive when used with the PC emulator.

Version 1.33 of the PC emulator provides a cure for this by reading the step rate values stored in the CMos Ram. This change limits the PC emulator to a total of three floppy drives, as opposed to the four which are supported in previous versions.

The setting of the step rate for the second drive becomes very important when using a 5.25in drive with the emulator. You can experiment with the step rate values as illustrated with the example below:

*Configure Step 12 1

This will set the step rate of the drive to the slowest value possible with the 1772 disc controller, other possible values are 6, 3, 2. An explanation of this command can be found in the User Guide supplied with the machine.

Version 1.33 of the PC Emulator can be obtained either directly from SID or from your local SID registered Acorn Approved dealer.

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Brother HR10,15,20,25,35 Multistrike	£4.65
Canon PW1080A	£3.85
Citizen 120D/Swift 24	£3.05
Epson LX80,86	£2.25
Epson FX80,MX80,LX800,LX850	£2.95
Epson LQ500,LQ800,LQ850	£3.00
Epson MX100	£3.00
Epson LQ1000,LQ1050,FX1000	£3.50
Epson LQ2500,LQ2550	£3.55
Epson EX800	£4.45
Panasonic KXP1081,1090,1080	£3.65
Panasonic KXP1124	£3.55
Seikosha GP100	£3.20
Star LC10	£2.55
Star LC24/10	£3.95

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Amstrad DMP2000/3160	£5.50
Canon BJ130 Bubblejet	£10.00
Canon BJ10e	£16.29
Citizen 120D	£3.25
Citizen Swift 24 Black	£3.95
Citizen Swift 24 Colour	£13.75
Citizen Swift 24x Black	£8.00
Citizen Swift 24x Colour	P.O.A.
Colourjet 132/Canon PJ1080 Black	£8.60
Colourjet 132/Canon PJ1080 Colour	£14.60
Epson LX80/86	£3.75
Epson FX80,MX80,LX800	£4.50
Epson LQ400,550 Fabric	£5.25
Epson MX100,FX1000,FX1050	£5.75
Epson EX800/1000 Black	£7.25
HP Paintjet Black	£21.00
HP Paintjet Colour	£26.00
HP Deskjet +	£13.20
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Panasonic KXP140	£9.35
Panasonic KXP115	£7.50
Star LC10	£3.80
Star LC10 4 Colour	£5.75
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Star LC200 Colour	£9.75
Star LC24/10 / LC24 200 Black	£4.75
Star LC24 200 Colour	£11.50
Canon LB4 Toner Cartridge	£59.00
Canon LBP8 Toner Cartridge	£69.00
Qume Crystal Print Toner Set	£67.00
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Software

DTP

Impression II (CC)		£145.00
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Tempest D.T.P. (Clares)		£99.00
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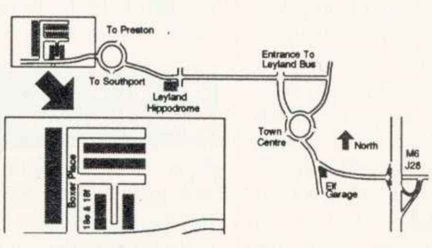
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RISC REVUE

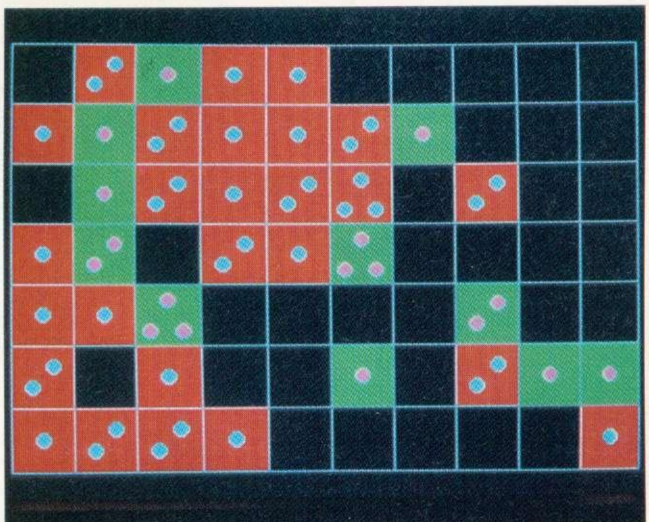
£25 ATOMIC NUMBER

Our first April offering is an intriguing strategy game from **Adrian St John** of Aylesbury. *Atoms* can be found as listing 1 in the yellow pages – just type it in and run it.

Players may number from two to six and they take turns in placing 'atoms' on the board. The object is to take over all of your opponents' atoms and this is achieved by causing 'chain reactions'. To place an atom in the grid, move the pointer over the desired square and press Select. You can only place atoms in empty squares or those containing atoms of your own colour. When there are enough atoms in a square it becomes unstable and throws out its contents into the surrounding squares. The critical number is 2 for corner squares, 3 for squares on the sides and 4 for those in the middle.

If one of your squares becomes unstable and throws out its atoms, these will take over any of your opponents' squares if they are adjacent. If you manage to change all the squares to your colour then you have won. The really interesting feature of the game is that one unstable square may cause others to become unstable and the reaction will continue until all squares on the board are stable.

The program itself is a model example of well-written Basic using a neat 'recursive' procedure to deal with the chain reactions. Apparently Adrian based the game on a public domain program for the *Atari ST*. PROCinit sets up the main variables and arrays.



THIS GAME CAN ONLY BE DESCRIBED AS, WELL ATOMIC!

PROCgame contains the main loop and this calls PROCplay for each player that remains in the game. It is PROCreact that does all the work. It is called by PROCplay when a player adds a new atom and it also calls itself should any square become unstable and chuck its atoms at its neighbours.

PROCreact takes three parameters – the x and y coordinates of a square and a player number. An atom is added to the square and the scores of the players – held in the array count() – are updated. If a players' count becomes zero they are eliminated from the game. The critical number is calculated for the square (and held in reactor). If the total for the square (amount(x,y)) equals or exceeds reactor then reactor atoms are removed and PROCreact is called for each of the adjacent squares.

You might like to change the size of the grid – to do so alter the value of size%. Make sure the new value is a multiple of 12 though, so that the atoms are all drawn the same size. If you're feeling adventurous you might like to try writing an intelligent routine that lets you play against the computer. If you do then why not send it in? We look forward to seeing what the talented Risc Revue readership can come up with.

£15 WAVE POWER

Next comes a little graphic offering from **Barry Wickett** of Walsall (whose name you might remember from Risc Revue November 1990). This one is a little wave-effect number that takes a sprite and wobbles it according to a predefined formula. Barry's program is listing 2 and, by default, uses the PaintDemo sprite file that comes with the Risc OS applications.

The idea is quite simple. A table is built up containing the height of a 'wave' at various points along its length. In the listing the wave is assumed to be 256 pixels long and for each point a four-byte height is calculated and stored in the table. The sprite is plotted using two loops – one inside the other. Each point (x,y) in the original sprite is placed on the screen at (x1,y1) where x1=x+y and y1=y+height (x+count)-x. The value height(x+count) is looked up in the table. The variable count is simply a counter which rises from 0 to 1020 at a predefined speed and then wraps around to 0 again. It is this counter that allows the wave to move. Note that y is added to x to get x1 and x is subtracted from y to get y1. This is so the sprite is plotted diagonally up the screen and gives the pleasing appearance of perspective.

You'll notice that before the 'wobbling' routine is called, a black rectangle is plotted around the edge of the sprite (by redirecting output to the sprite and using RECTANGLE). This is a bit of a cheat really, as it is an easy way of ensuring that pixels are erased correctly. Even so, if you choose too whacky a formula for the wave, a slight trail of pixels may be left behind. It is worth experimenting though. As an example try changing the formula at line 1130 to:

```
!P%=x%*SIN(ang)/16
```

You might also like to try

changing the value of speed as defined in PROCmc. This is the speed at which the wave moves down the sprite – it should be a multiple of four since wave height values are stored as four byte integers.

£5 CMOS TIPS

All readers will be familiar with the *Configure command used to set 'permanent' variables in your machine. In total there are 240 bytes of so-called 'non-volatile' or CMos Ram. These bytes, kept fresh by a couple of batteries, hold a whole host of bits of useful information while you're away from the computer: flags used by the operating system (number of floppy drives, etc), flags used by applications and plenty more. **Rich Noakes** of Swansea reminds us that we ('the users') have our very own 16 bytes of CMos Ram to do with what we please and, although 16 bytes doesn't sound much in a machine with anything from one to eight megabytes of main memory, they can come in very useful.

Rich's example program (listing 3) shows how to write to and read from the bytes of CMos Ram. Two OS_Byte calls are used: 161 to read and 162 to write. In each case the second parameter (register R1) contains the number of the byte being written/read and the third (register R2) the value being written/read. The bytes we can use are numbered 30 to 45 and Rich's program displays the contents of these and then updates them with a string supplied by the user.

The OS_Byte calls can be used to change any of the other bytes in the CMos Ram – all except byte 0 which contains the Econet station number of the machine. For security reasons this must be changed



DON'T GET SEASICK!

using a special program. Otherwise it would in theory be possible to pretend to be someone else's machine and gain access to their files.

You should be careful not to play around with the non-user bytes of CMos Ram. Putting certain values in certain places can cause the machine to be severely messed up – the only cure being to switch it off, take out the batteries and wait for an hour or two!

SET PIECE

I rambled on a bit last month about system variables and the like, so it's *BAU* regular **Dave Lawrence**'s turn this time. He's provided a little program to demonstrate the special 'code' type of variable and it is listing 4 on the yellow pages.

The program assembles a short piece of machine-code which it saves as a utility called ScrVar. When this is run (with *ScrVar), a variable called Screen$Start will be created. This has the value of the address in the top left-hand corner of the screen – a useful number when it comes to plotting 'directly' on the screen. For the current value, type *Show Screen$Start.

Code variables are special in that their values are calculated by a piece of machine-code that you provide.

A code variable is created using OS_SetVarVal, just like other types of variable, but as you can see from listing 4 the registers R0 to R4 must contain the following:

R0 pointer to variable name (Screen$Start in our case), R1 address of code to provide value of variable, R2 length of code, R3 used if wildcards are used (0 in our case), R4 16, meaning 'code' type.

The piece of code itself must be written according to certain rules. The first instruction should be a branch to the code responsible for writing a value to the variable.

The read code should follow this branch. When writing a value, the code is called with R1 pointing to the value and R2 to the length of the value. Only strings are passed to or read from code variables. The read code should return with



PLOTTING WITH TRANSPARENT PIXELS!

R0 pointing to the value and R2 containing the length of the value.

In the example, there is no write code and the read code gets the screen start address using OS_ReadVduVariables and converts it to a string with OS_ConvertHex8. Dave suggests changing the name after varname to Key$1. Then press f1!

MASKED MARVELS

We've talked about redirecting VDU output to sprites many times in Risc Revue. It's a technique used frequently to speed up redrawing in the desktop and you'll see it all over the place, including listing 2, the sprite wobbler. The idea is simple – a call is made (OS_SpriteOp 60) so that all subsequent graphics commands apply not to the screen but to a given sprite.

Another call, less well-known but very useful in its way is OS_SpriteOp 61 which allows you to plot to a sprite's mask. Masks are used so that when plotting a sprite only the parts you wish to appear do so. Backgrounds can be left intact. Masks are very similar to the sprites to which they are attached. They are clearly the same size, but also have the same number of bits per pixel. So, a sprite defined in a 256-colour mode such as mode 15 will have a mask with one byte per pixel, just as the sprite itself has one byte per pixel.

The same can be done with masks. A pattern is drawn on the screen using PROCgrid. Then another image is superimposed using sprite masks to keep the original background.

Having defined a sprite, the first step is to create for it a mask. This is done with OS_SpriteOp 29. In the listing, OS_SpriteOp 60 is used to redirect output to the sprite so that the foreground pattern and message can be plotted. Then OS_SpriteOp 61 is called to switch output to the mask. Generally speaking only two colours should be used when plotting on a mask – 0 and h, where h is the highest available colour number. Using other values will have interesting effects in colour modes, masking out some bits of colours but leaving others.

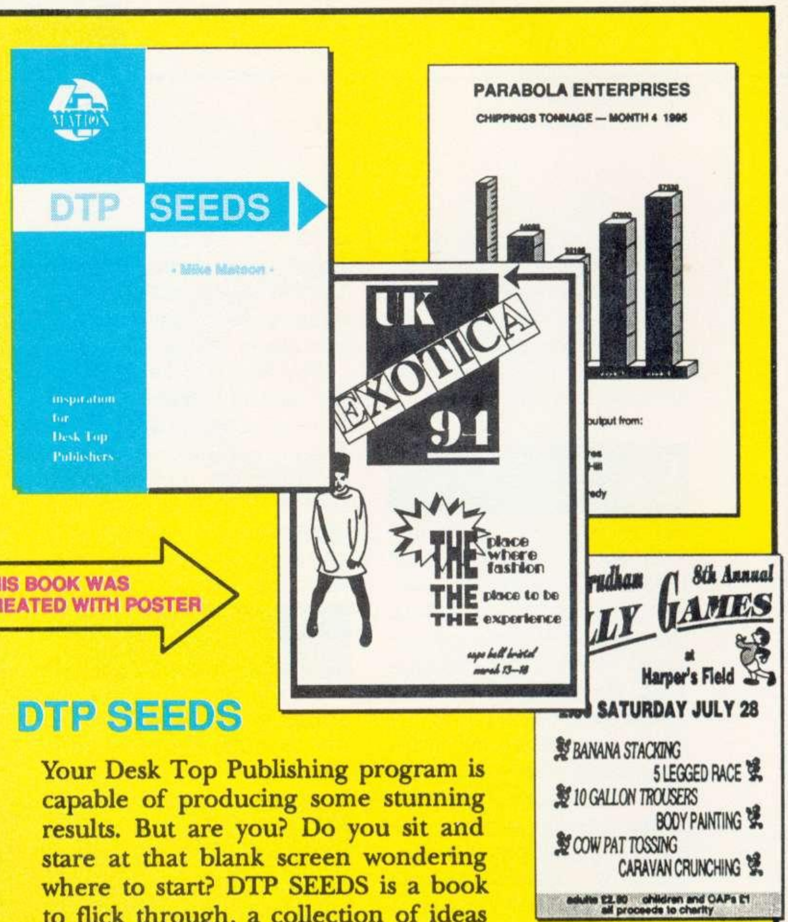
In the example, the whole mask is first set and then a hole is cut out of the middle. Finally a message is printed. Then the sprite is plotted at the correct point on the screen and the process continues with the next strip. Note the use of the ORIGIN command to ensure that the right bit of foreground picture is plotted on each strip. The technique of plotting in strips, although time-consuming, is useful when memory is short. Risc OS printer drivers use such a technique.

All programs, ideas, hints and tips most welcome. Send them to: Risc Revue, *BBC Acorn User*, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ.

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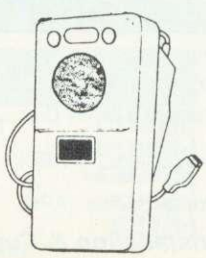
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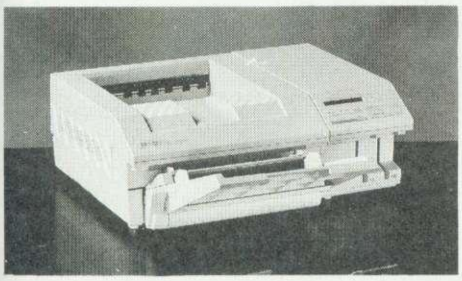
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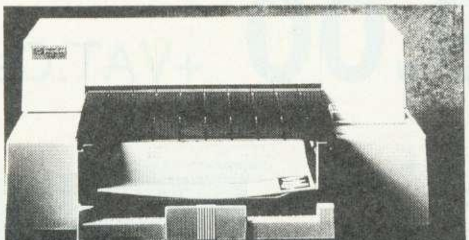
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Link your Deskjet printer (any model) to Model B or Master using the FX Emulation Cartridge and use all your old Epson dumps and drivers.
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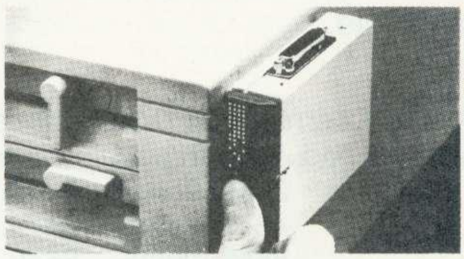
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Alerion	14.95	11.95
Alien Invasion	14.95	11.95
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Alpha-Base	49.95	39.95
ALPS System	32.00	26.95
Amazing Ollie (Educ)	16.04	14.95
Ancestry	79.95	69.95
Ansi C (Release 3)	171.35	144.95
Apocalypse	29.95	29.95
ARC-COMM	33.35	29.95
Arc Monitor	24.95	19.95
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ARC-PCB Professional	375.00	319.95
Arc Games Controller	40.24	33.95
Arcade 3 Compilation	14.95	11.95
Arcade Soccer	14.95	14.95
ArcDFS	29.95	26.95
Arcendium	14.95	11.95
Arch Operating System	21.95	-
Arch Assembly Lang	21.95	18.95
Arch Basic Compiler	99.95	89.95
Arch. First Steps	9.95	7.95
Arch Joystick Interface	27.55	24.95
Arclight	50.00	39.95
ArcPinball	24.95	19.95
Arcterm 7	79.95	69.95
Armadeus	79.95	69.95
Armadeus Sound-		
Astro	22.94	19.95
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fun school 3

UNDER 5's Includes:-

- COUNTING - Help teddy reach the jar of honey by counting up to nine
- LETTERS - Join in all the fun at the alphabet fair by pairing large letters
- MATCHING - Pair up the shapes to fill teddy's piggy bank with money
- ACTIONS - Make teddy jump, hop, sleep, juggle, skip, eat & more
- PAINTING - Colouring fun down on the farm with all the pigs & cows
- GALLERY - Learning to read is really easy in the Fun School Gallery.

5-7 YRS Includes:-

- TOYSHOP - Spend your pocket money wisely in the shop
- TIME - Tell the time & watch the cuckoo clock come alive
- FUNTEXT - Explore the Ceefax-style database & take the challenge
- COLLECT - Guide the frog from log to log to create & solve the sums
- ELECTRICITY - Fix the incorrect circuits to set the bell ringing
- JOURNEY - Travel round the village & learn about directions.

OVER 7 YRS Includes:-

- TREASURE SEARCH - Follow compass directions to find the jewels
- WORD SEARCH - Pick out the words cleverly hidden in the large grid
- ROBOT DRAW - Create beautiful patterns & learn how to program
- PLANETARY MATHS - Solve the sums before they hit the forcefield
- SENTENCES - Correct spelling, punctuation & grammar mistakes
- DATABASE - Store information, sort it, search it, then test yourself.

Release delayed - now due approx
Feb/Mar 1991 – Prices per level
SRP BBC Cass £12.99 **Sale £9.95**
SRP BBC 5.25" Disc £16.99 **Sale £13.95**
SRP ARC Disc (release postponed, please call for details) £24.95
Sale £19.95(Cheques cashed/credit cards debited only on day of despatch)

fun school 2

BBC/ELE CASSETTE SRP £9.95 **Offer Price £7.95**
BBC 5.25" DISC SRP £12.95 **Offer Price £9.95**
(All prices per age-range - 0-6 yrs, 6-8 yrs or 8+ years)

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E-Type	9.95	14.95	–
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Exile	9.95	11.95	15.95
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Master Break	7.95	9.95	11.95
Perplexity	7.95	9.95	11.95
Pipemania	7.95	11.95	11.95
Repton Infinity	9.95	11.95	15.95
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Tank Attack	8.95	11.95	–
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Superior Col 2 (BBC only)	6.95	8.95	10.50
Superior Col 3 (Ele only)	6.95	–	–

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(Number recognition, counting, adding, maze solving & hand-eye co-ordination)
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(Role play at sea involving maths, geography, English, science & history)
Coffee 9 + Yrs £25.00
(Role play on land involving maths, geography, English, science & history)
(5.25" disc only - state 40T or 80T)
Full details available on request

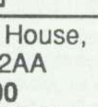
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Joysticks for BBC, B+/Master 128 & Electron Plus 1

Delta 3B Twins
£19.95
2 analogue, light spring action, joysticks wired to one plug



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Analogue, light spring action joystick. Can be used as either left or right-handed.



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KX-P1081	Panasonic 9 pin 80 col dot matrix	**£159.95**	**SP-200**	Seikosha 9 pin dot matrix	**£179.95**
KX-P1180	Panasonic 9 pin 80 col dot matrix	**£169.95**	**SL-92**	Seikosha 24 pin dot matrix	**£269.95**
KX-P1124	Panasonic 24 pin 80 col dot matrix	**£259.95**	**MP-1350**	Seikosha 9 pin dot matrix	**£314.95**

(Prices include VAT, printer cable & courier despatch - (UK mainland only). Please state for which computer you require the printer)

- Please add 95p P&P (Europe £2.50, Outside Europe £4.50)
- All prices include VAT (except books which are zero rated)
- Goods despatched within 48hrs (subject to availability)
- Out of hours answerphone . . 0532 436300
- Educational discount of 30% off SRP available on Archimedes software, Official Order No. required – minimum order value £30.00
- Prices correct at time of going to press, E& OE

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Telephone **0532 436300**
Please make cheques payable to SOFTWARE BARGAINS

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** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer
(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030
Offer Price: £499

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead. **Only £21**

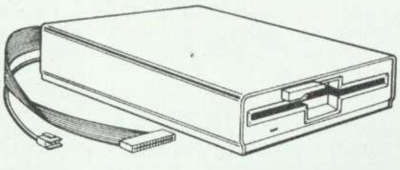
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during March

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module		£115
Econet Module for the Master		£45
Twin ROM Cartridge for Master		£9
Quad ROM Cartridge for Master		£14
Master Reference Manual I	(No VAT)	£14
Master Reference Manual II	(No VAT)	£14
Master Advance Ref Manual	(No VAT)	£17
64K Upgrade Kit for B+		£32
Acorn 1772 DFS Kit complete		£49
ECONET Upgrade Kit for BBC B		£42
ALL ECONET UPGRADES Available		
ARIES' IEEE Interface for BBC B & Master		£238
Morley Teletext Adaptor with ATS Rom		£99
Filestore E01S £899	Filestore E40s	£749
Filestore E60S £949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

SPRING HANDS-ON OPEN DAY

The Date:	Sunday 7th April 1991
The Time:	10.00pm to 4.00pm
The Place:	Jessa House, 250 Lower High St, Watford
The Event:	Watford's ever popular Open Day
The Sponsors:	The BBC Acorn User and The Micro User magazines

Another chance to bring out the family and make a visit to Watford Electronics to watch, to learn, and talk to other like minded enthusiasts, experts and novices on the subject of Acorn BBC and Archimedes range of computer systems.

See displays and demonstrations of the latest in Acorn Computer technology from the experts.

- **BBC Archimedes A3000**
- **Archimedes A400 series**
- **BBC Master 128 micro**
- **Watford Aries PCs**

Also appearing:

• **Colton Software:**	Pipedream 3
• **Minerva:**	Atelier, System Delta and various business softwares
• **Silicon Vision:**	RISC BASIC, Solid CAD, Solid Modeller, etc
• **Superior Software:**	Various Games & the New Launch 'Archimedes Speech Utility'
• **Computer Concepts:**	Laser Direct & Impression DTP
• **Panasonic UK:**	Full range of Panasonic printers
• **TAXAN UK Ltd:**	Full range of Multiscan Monitors

Technical Support

- Watford Electronics own technical team will be available to discuss problems and offer advice on Acorn computer equipment.
- The Micro User's Mike Cook of the 'Beeb Body Building course' fame, will be there to help and advise on BBC related matters.
- Gordon Taylor, the renown Archi 'Guru' and technical writer will be available for discussions on all things Archimedes including Computer Concepts' Impression DTP package.
- Representatives of Acorn Computers will talk about proposed new products, and listen to your suggestions.

Educational Support

A private area allocated to the specialist in education will be provided.

- Peter Howes of Acorn Computers will be at hand to discuss educational requirements for both, Parents & Teachers.
- Ex-teacher and Micro User's Consultant editor, Peter Davidson will be on hand to talk about current trends and requirements in the Acorn Computer educational sector.
- Nazir Jessa, Watford Electronics Managing Director, will be happy to discuss special deals and packages for educational establishments and parents.

Finance Available

Purchases can be made at the Open Day and Instant Credit deals will be available for up to £1,000.

FREE REFRESHMENTS will be served throughout the day

Continued→ → → → → → → → → →

Archi A4 Scanner

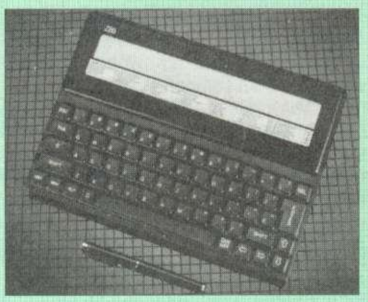


This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

Z88 Portable Micro



£189

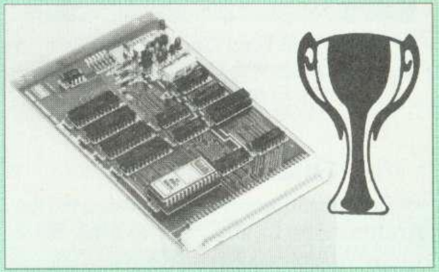
FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

• 32K RAM Pack or 32K EPROM Pack	£18.00
• 128K RAM Pack or 128K EPROM Pack	£42
• 512K RAM Pack	£175
• Z88 Eprom Eraser Unit	£33
• Z88 Spellmaster for Pipedream	£51
• Z88 Carrying Case	£8
• Z88 Computing Book	£9.95
• AA Nicad Rechargeable Battery	£1.50
• Battery Charger Compact & Fast	£6
• Z88 Serial Printer Cable	£8
• Z88 Parallel Printer Cable	£25
• Z88 to Archi Link	£15
• Z88 to BBC Link £20 • Z BASE	£56
• Z88 to PC Link II £30 • Z TAPE	£42
• Z88 to Macintosh £52 • Z TERM	£42
• Z88 Mains Adaptor £9 • Z88 Modem	£149

Archimedes Real-Time Digitiser



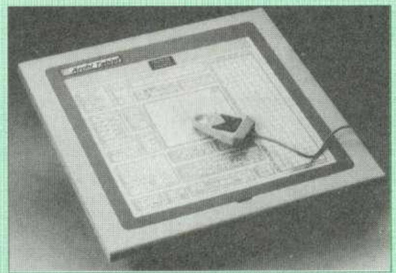
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic).

(FREE this month, PC Mouse Drivers & Art package)

(Now, fully LinCAD compatible. Recommended by Linear Graphic).

Special Price £225

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£29**

Disc Plonker Rack



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

• Watford sophisticated DFS ROM	£16.00
• Watford DFS Kit complete	£69.00
• We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
• DFS Manual (comprehensive)	£6.95
• Acorn DNFS ROM	£17.00
• Acorn ADFS ROM only	£25.00
• Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

• SPECIAL PRICE	**£44.00**
• DDFS Manual (No VAT)	**£6.95**
• We will exchange your existing DFS Kit for our sophisticated DDFS for only	**£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

• *10 x 5.25" S/S D/D 40T (744)*	*£5*
• *10 x 5.25" D/S D/D 40T (745)*	*£5*
• *10 x 5.25" S/S D/D 80 Track (746)*	*£7*
• *10 x 5.25" D/S D/D 80 Track (747)*	*£7*
• *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£11*
• *10 x 3.5" S/S D/D 40/80 Track*	*£7*
• *10 x 3.5" D/S D/D 40/80 Track*	*£8*
• *10 x 3.5" Double Sided High Density*	*£15*

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

• *10 x **M3** 3.5" D/S D/D 80 Track*	*£7*
• *10 x **M9** 3.5" D/S High Density*	*£14*
• *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
• *10 x **M5** 5.25" D/S D/D 40 Track*	*£5*
• *10 x **M7** 5.25" D/S D/D 80 Track*	*£7*
• *10 x **M8** 5.25" D/S H/D Hi-Density*	*£11*
• ***M2** 3" Double Sided*	***£2.50** each*

VISA Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

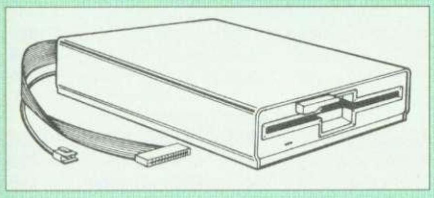
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

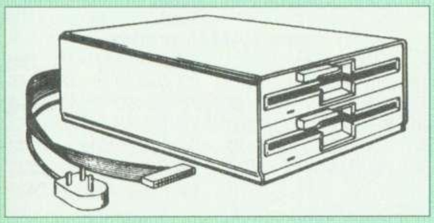
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Type	Description	
	Disc Drive without PSU	
• CLS400S:	Single, 40/80 track 400K Double sided Drive	£72
• CLD800S:	Twin, 40/80 track, 800K Double sided Drives	£142
	Disc Drive with PSU	
• CS400S:	Single, 40/80 track, 400K Double sided Drive	£82
• CD800S:	Twin, 40/80 track, 800K Double sided Drives	£155

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

CLS400S Disc Drive & Mk 2 DDFS Offer



- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£119** (Offer valid until stocks last)

3.5" DISC DRIVE

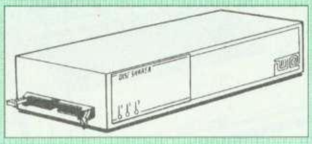


These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• CLS35:	Single Disc Drive, 400K	£62
• CLD400S:	Twin Disc Drives, 800K	£109
	Disc Drive with PSU	
• CS35:	Single Disc Drive, 400K	£83
• CD35:	Twin Disc Drives, 800K	£126

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

DISC DRIVE SHARER

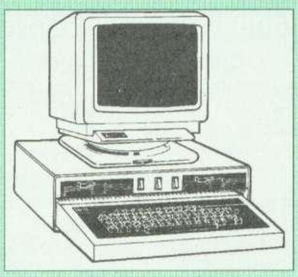


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables OfferPrice: **£55**

Disc Drives in Monitor Stand



- **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

- **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

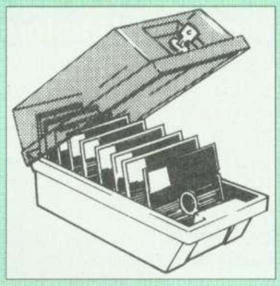
Price: £154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

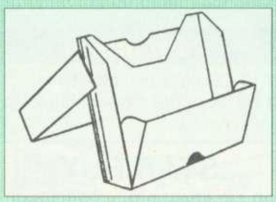


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs.	£1.50
Holds up to 10 x 5.25" Discs.	£2.00

Dust Covers (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50		£52 for 100

Continued→ → → → → → → → →



Microvitec Monitors

- **1431** – Standard Resolution Monitor £172
- **1451** – Medium resolution, suitable for word processing in mode 0 £215
- **Cub3000** Medium Res for A3000 £195
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Multiscan Colour

- **EIZO** 9060SZ Low Radiation, Antistatic screen, Ultra Hi Res 800 dots x 600 lines. 0.28 Dot £399
- **EIZO** 9070S 16" Low Radiation .28 Dot pitch. As used on Archi 540/1 £599
- **PANASONIC** – 14" Super High Res. 0.29" Dot pitch, non glare screen. Built-in Swivel base **Special £349**
- **TAXAN** 770LR Low Radiation Multiscan £386
- **TAXAN** 775 Plus – 0.28 Dot pitch Ultra high resolution, anti-static screen £386
- **TAXAN** 795-A TRINITRON 0.26 Dot pitch 1024 x 768 Non interlaced £455
- **VIDC** Enhancer Board £29

(P.S. VIDC Enhancer board is supplied FREE with every TAXAN 795 Monitor)

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £173

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £159

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

By popular demand, we are now able to supply refurbished and fully guaranteed, Acorn range of Micros.
(Please telephone for price & availability)

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

- Desk Jet 500 £368
- Quiet Jet Plus £376
- Desk Writer £485
- Scan Jet Plus £725
- Desk Jet Cartridge £15
- HP Think Jet £240
- Paint Jet Colour £625
- Rugged Writer £849
- Paintjet XL £1155
- Paintjet Cartridges Black £19; Colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge £59

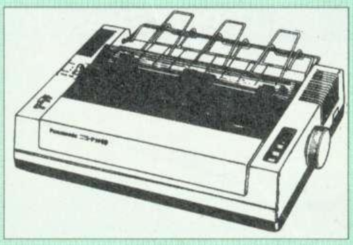
HP Apple Talk Interfaces for

- Scan Jet £299
- Paint Jet £55
- Mac Interface for Scan jet+ £1175

Canon Bubblejet Printers

BJ 10E £222 BJ300 £355
Cut Sheet Feeders: BJ10E **£54** BJ300 £88

Panasonic Printers



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros, please specify)

- **KX-P1081** 9pin 80col. 144/28 cps £124
- **KX-P1180** 9pin 80col. 192/38 cps £129
- **KX-P1123** 24pin 80col. 192/63 CPS £166
- **KX-P1124** 24pin 80col. 192/63 CPS £185
- **KX-P1624** 24pin 132col. 192/63 CPS £305
- **KX-P1695** 9pin 132col. 330/86 CPS £310

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Citizen Printers

120D Plus	£99	124D Printer	£165
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24	£216

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £32
- Swift 24 Ribbons Black £4 Colour £13

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £117
- **LC10-II** 9pin 80col. 180/45 CPS £139
- **LC15** 9pin 136col. 180/45 CPS £242
- **LC24-10** 24pin 80col. 180/60 CPS £163
- **LC24-15** 24pin 136col. 200/67 CPS £305
- **FR10** 9pin 300/76 CPS 31K 16 fonts £275
- **FR15** Wide carriage version of above £365
- **XB24-10** 24pin 80col. 240/80 CPS £360
- **XB24-15** 24pin 80col. 240/80 CPS £480
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £160
- **LC-24-200** 24pin 80col. 222/67 CPS £195
- **LC24-200** Colour 24pin 80col. 222/67 CPS £230

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139
LC24-200	£63		

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49
8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200	£55
32K Ram Card for XB24-10 & 15	£55

Ribbons

LC10; LC10-II; LC15	Black £4;	Colour £6
LC-200; LC24-200	Black £5;	Colour £12
XB24-10; XB24-15	Black £5;	Colour £12

Laser Printers

Canon LBP-4	4ppm	£690
Canon LBP-8 IIIR	8ppm	£1535
Canon LBP-8 IIIT	8ppm	£1410
Epson EPL7100	6ppm	£720
HP Laserjet IIP	4ppm	£659
HP Laserjet III	8ppm	£1035
HP Laserjet IIID	8ppm	£1575
Panasonic KX-P4420	8ppm	£675
Panasonic KX-P4450i	11ppm	£1079
Panasonic KX-4455 Postscript	11ppm	£1699
Qume Crystal Print WP+		£695
Qume Crystal Print Ser. 2		£1065
Qume Crystal Print Publisher 2		£1899
Star LP-8 III		£1089
Star LP-8 Star(post)script		£1225

Laser Toners

Canon 2 & 4	£55	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£59
KX-P4420/50	£25		

Laser RAM Upgrades

HP Laser RAM		GQ5000 512k	£95
IIP & III 1MB	£95	KX-P4420 1M	£249
IIP & III 2MB	£125	KX-P4450i 1M	£299
II & IID 1MB	£102	KX-P4450i 2M	£575
II & IID 2MB	£127	Star LP-8 1MB	£143
II & IID 4MB	£315	Star LP-8 2MB	£285
		Star LP-8 4MB	£429

Laser Drum & Developer

Epson Drum GQ5000	£129	EPL7100	£129
Panasonic 4420 Drum	£69	Developer	£59
Panasonic 4450 Drum	£99	Developer	£80
Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

for Laserjet II £369 IID & III £375

NEW – HP Laserjet

Various Font Cartridges	£45
Superset Font	£195

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Special Offers this month

Canon BJ 10E Printer	£219
HP Deskjet 500 Printer	£349
Panasonic KX-P1123 Printer	£162
Panasonic KX-P1124 Printer	£180
Panasonic KX-P1592	£199
TAXAN 795 Trinitron	£435

Epson Printers

DFX5000	£1105	LQ860 Colour	£489
DFX8000	£2070	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719
LQ850+	£425		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550	£69
EX800/FX800/850/LQ800/850	£130
FX/LQ 1000/1050/SQ850	£159
LQ 2550 **£390** SQ2550	£176

Tractor Feed for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option **£45**
- EX800/1000 Colour Ribbon **£14**
- LQ2500 Colour Option **£65**
- Multifont Card for LQ550/850/1050 **£95**

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Roland Plotters

(Official Roland Appointed Distributor)

• DPX 2500	£2389	• DXY 1100	£528
• DXY 1200	£699	• DXY 1300	£889

New Launch

Roland SketchMate

The Intelligent Graphic Plotter

The SketchMate offers the same high performance and versatile function of larger, more expensive plotting systems, but at an affordable price. It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. The 'ArtMate' software package supplied, is designed to be used with IBM PC/AT systems.

Specifications: Plotting area: 297 x 216mm. Number of Pens – 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

Launch Offer: £380

VISA Access

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper **£7**
- 2,000 Sheets 9.5" x 11" Fanfold Paper **£11**
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold **£21**
- 1,000 Sheets 15" x 11" Fanfold Paper **£9**
- 1,000 Sheets true A4 Fanfold Paper 70gms **£11**
- 2,000 Sheets true A4 Fanfold Paper 70gms **£21**
- Teleprinter Roll (Econo paper) **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £139 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180/P1624	£7
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	**£9.95 each**

Professional Printer Stand



The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£36	£32

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.
Centronics **£18**; Serial **£17**
(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

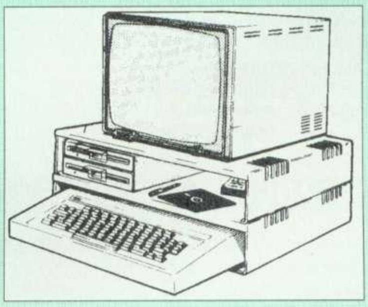
These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out **£135**
- 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

Plinths for the BBC B & Master 128K Micros

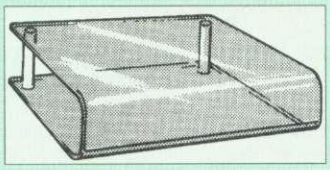


Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Continued→ → → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint £58
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont £89
- Quest Mouse II only £29
- Quest Paint Software only £34
- Quest Font Disc (22 Text Fonts) £15
- Quest Mouse Mat (Red or Blue or Green please specify) £3
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer £18

(P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

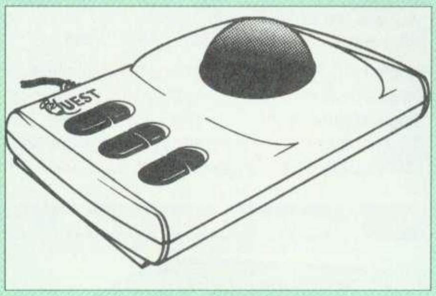
ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £32

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.



QT-10 BBC/Master Version £27
QT-20 Archimedes Version £30

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

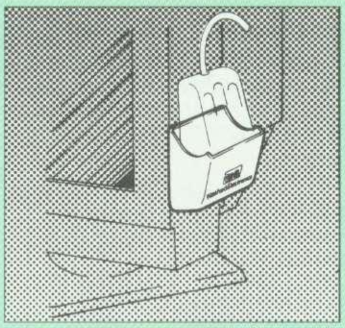
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

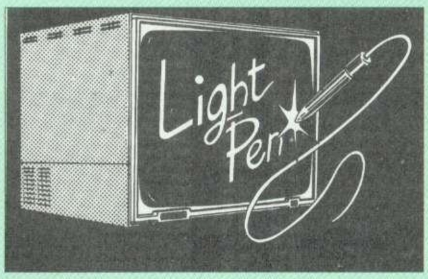
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER



"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.
The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.
All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware £135



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.
Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.
Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions.

£12

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only).

£13

Laser Direct



By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

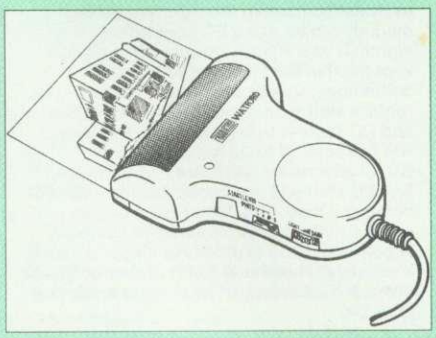
- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer £325
- LPB4 Printer plus High Res Card £1025

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

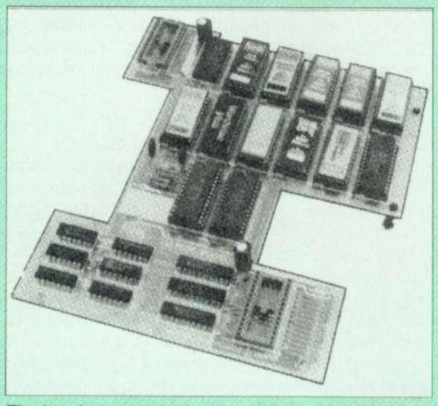
AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accomodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

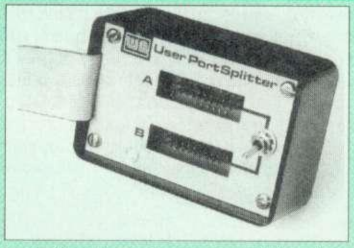
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

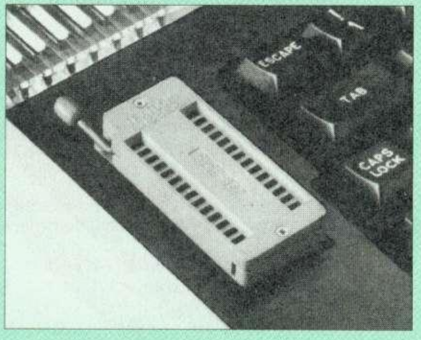
User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	£11
• Spare Cartridges	£2.75
• Spare Rack	£1.65

ROM Cartridges for the BBC Master

Will accept the new larger PIggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:		
	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

Voltmace Joysticks

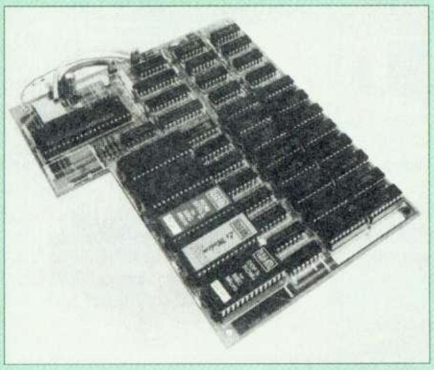
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

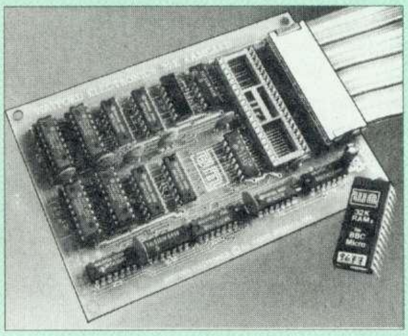
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches **£2 each**

Complete ROM-RAM board
All options installed **£115**

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.
- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)

(Price includes a comprehensive manual and the ROM)

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£20.00**
- Maths with a Story 2 (Disc). 4 further maths programs. **£20.00**
- Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs. **£17.00**
- ECOLOGY O-Level program. **£20.00**
- POLYMERS O-Level program. **£20.00**
- Classification & Periodic Table O-Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20.00**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20.00**
- Computers at Work – Primary **£17.35**
- Introducing Geography 11-17 years **£17.50**
- Electric Fields 6-14 years **£11.25**
- Espana Viva – 3 Discs **£19.95**
- WHITE KNIGHT Chess game **£16.00**
- A Vous La France **£29.00**

More Educational Software

- **FUN SCHOOL 2 – Red:** Under 6 yrs – 8 programs on Discs, Shape Snap, Find the Mole, Teddy Count, Write a Letter, Colour Train, Pick a Letter, Spell a Word & Teddy Bears Picnic. **£12.00**
- **FUN SCHOOL 2 – Green:** 6-8 yrs – Eight programs on Disc, Number Train, Shopping, Maths Maze, Treasure Hunt, Bounce, Packing Caterpillar, 3 Number jump **£12.25**
- **FUN SCHOOL 2 – Blue:** Over 8 yrs – Eight programs on Disc, Build a Bridge, Passage of Guardians, Unicorn, Logic Doors, Souvenirs, Code Boxes, Mystery Machine & Escape. **£12.50**
- **FUN SCHOOL 3 – Red** **£19.95**
- **FUN SCHOOL 3 – Green** **£19.95**
- **FUN SCHOOL 3 – Blue** **£19.95**
- Six French Games – Aimed at pupils in their first year of French, but also useful as revision for more advanced students 11 years+ **£26**
- More French Games – Another 6 games 12 years+ **£26**
- Au Restaurant and Accident de Route 12 years+ **£26**
- Boulogne and Oh-Les – 2 programs for beginners **£26**
- Letters to French Penpals – 11 years+ **£26**
- French Programs with Henri Beret – The programs in this series present vocabulary, grammar and role-play phrases in the form of animated games. 11-16 **£22**
- Six German Games – Aimed at pupils in their first year, but useful as revision for more advanced student of German. 12 years+ **£22**
- More German Games – Aimed at pupils in their 2nd year of learning German. 12 years+ **£22**
- The Cloze Program – Using context clues to predict is much more than a gap filling exercise. All ages **£26**
- An Introduction to Electronics – Brings together all the basic electronics required for a GCSE Physics or CDT course. 14-16 years **£26**
- Computer Control – This is a package of 3 programs simulating control of a greenhouse, a robotic arm & a chemical plant. 14-16 years **£26**
- The Nuclear Reactor – An interactive, menu driven program for GCSE pupils. Demonstrates & explains nuclear fission & the chain reaction. 14-16 years **£22**
- PUNCMAN Learning punctuation
  - Puncman 1 & 2 for 7 – 13 years **£15**
  - Puncman 3 & 4 for 8 – 14 years **£15**
  - Puncman 5 & 6 for 8 – 15 years **£15**
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- Numbers & Pictures – Early number learning is a great fun (4-6 years) **£15**
- Note Invaders – Budding musicians can learn the notes on the Clef with this elegant game 3 programs (7 to Adults) **£15**
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- Help Your Child learn Basic Map work No. 2 (9-14 years) **£18**
- Pirate – Educational Adventure (8-14 years) **£15**
- Spelling Week by Week (6-14 years) **£18**

Archimedes Software

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- Bumper Disc 2 **£14**
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- Craftshop 2 **£26**
- Desktop Stories **£27**
- DigiSim **£35**
- Droom **£17**
- Jiglet **£27**
- Jigsaw **£28**
- Numerator **£60**
- Snippet **£26**
- Fun School 2A Red (up to 6 years) **£12**
- Fun School 2A Green (6-8 years) **£14**
- Fun School 2A Blue (8 years +) **£14**
- Gate Array Teaching System **£68**

Continued→ → → → → → → → →

Computer Concept's ROMS

Communicator	£49
Disc Doctor	£28
Inter BASE	£49
Inter CHART	£25
Inter SHEET	£37
Inter WORD	£36
Mega-3 ROM	£76
Spell Master	£42
TERMI	£25
Wordwise	£24

Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

Acorn ROMS

View 3.0 ROM	£45
View Professional	£50
Viewsheet (Acornsoft)	£36
Viewstore	£36
Viewspell with 80 track disc	£25
Viewplot Disc	£20
(Please specify for Master 128 or Compact)	
View-Index	£12
Overview packs 1 & 2	£65
Hi-View	£38

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.00
DISC Version for the Compact	£18.00

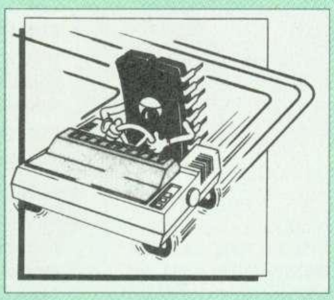
(When ordering please specify for which Micro & 40 or 80 track Disc)

All prices are exclusive of VAT

View Printer Driver Discs

Epson FX & RX 80	£10
Juki & Brother HR	£10

View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trial balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

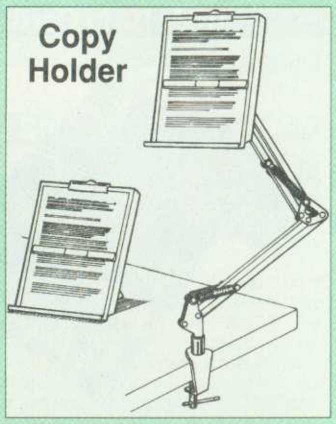
SPREADSHEET – Offers many calculation and editing features

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE
Only £10 (Disc)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)
Angle poise **£12** (carr. £3)

The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

ALL PRICES EXCLUDE VAT

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£6.95
15 Hr Wordprocessing BBC/WW & WW+	£6.95
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1st Word Plus Rel. 2 Manual	£10.00
A3000 Technical Manual	£29.00
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Archimedes DTP Manual	£10.00
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VIEW Dabhand Guide	£12.95
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Z88 Using Your	£9.95

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DOS Instant Reference (up to 3.3)	£6.95
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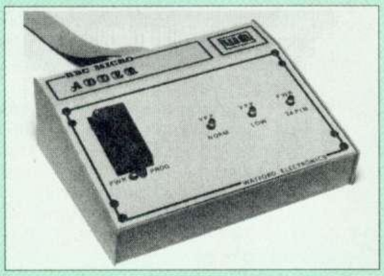
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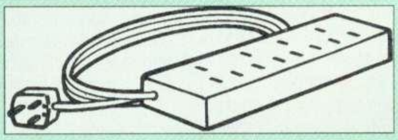
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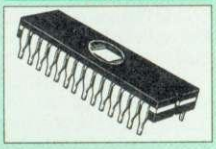
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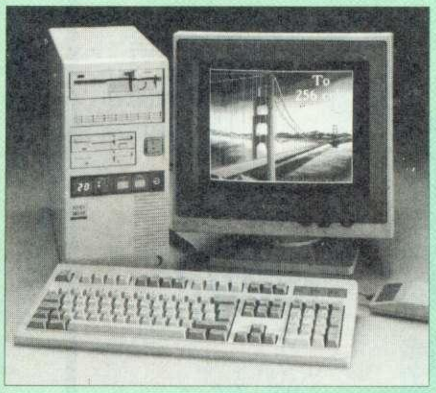
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Computer Shopper Jan. 1991

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EIGHT BITS

£20 COLOUR PRINTING

John Barker from Bath has sent in a well-written and interesting article on colour printing. I will let him continue:

BBC Acorn User (April 1988) provided two monochrome screen dumps, modes 0 and 1, for an Epson LQ-800 24-pin printer. These dumps also work on a Citizen Swift-24 printer.

The mode 1 dump produced is in shades of grey and sized 5.3 x 4.2in. It is used here as an example of how to write fast dumps for both nine-pin and 24-pin printers, and a new colour-printing program has been developed from it.

The printers available were the Citizen Swift-24 fitted with the multiple-colour ribbon option (Epson LQ compatible) and the Canon PW-1080 eight-pin monochrome printer (Epson FX compatible).

The principal requirement for speed is to write in assembler, the code for one pass of the printer head across the paper. This code can be embedded in Basic, to be called repeatedly until the whole picture is printed. There is little to be gained in speed by writing any more of the program in assembler, since Basic is fast enough.

In any dump the screen has to be scanned to find the colour of each pixel and the 'official' method is to use OSWORD with A=9 in assembler, or POINT(X,Y) in Basic.

Although easy to program (in screen co-ordinates x and y) even the OSWORD call is quite slow, and a considerable increase in speed is obtained by scanning the screen memory addresses directly, as was done in the 24-pin dumps mentioned above.



PRINTING IN COLOUR WITH THE CITIZEN SWIFT

This scanning code is written in assembler. In general, with the mid-section of the program also written in assembler, the computer is much faster than the printer. If the printer has only a small buffer (such as the Canon PW1080A) then the computer is held up as shown by the flickering of the SHIFT-LOCK lamp.

If the printer buffer is larger (Citizen Swift) then the computer finishes well before the printer does. My illustrative program is an eight-pin mode 1 dump, similar to the 24-pin mode 1 dump (given in April 1988), but the new program caters for the colour option.

With the data directed to a printer sink (by *FX5,0), the program took only 23sec on a BBC Master. Using the Citizen colour printer and re-activating the parallel port by *FX5,1, printing a picture in yellow, magenta, black (and white) took 190sec.

Each pass of the head was repeated three times because three inks were used. No pass was needed for white, but two passes would be needed for a secondary colour, such as green (= yellow + blue), and would take longer.

For three colours, each printed as black with no pass for the white, the Canon printer took 121sec. To print the pixels of just one colour on the Canon, the ink colours for those pixels which are not required are set to white (=white paper) in the initial screen dialogue, so that no passes are made for them.

To print just one colour took the Canon 42sec (or 13sec into a printer sink). This program is presumably much faster than the one given in Hints and Tips in *BAU* October 1988, to print pixels of just one chosen colour, since that was written entirely in Basic.

Both programs can be applied to colour separation printing with a monochrome printer, in which pixels of one colour are printed, the paper wound back, the ribbon changed for one of another colour, and so on.

Another interesting time-saving feature, which was first noticed in an Integrex printer colour dump, is to read all the pixels required for a sweep of the printer head before sending them to the printer.

Then, if there are no pixels to print in that sweep, it can be cancelled.

For some pictures, this can considerably shorten the total time taken, especially for colour dumps on ribbon-based printers, but it only takes a single vertical line (eg, a border) one pixel wide to make it necessary to do every sweep in that colour!

This feature has not been incorporated in the illustrative program provided.

Readers may be wondering why an eight-pin program is provided, rather than a 24-pin one, apart from the fact it is easier to write! First, the program will work on either of the printers tried (and maybe on other nine-pin printers fitted with colour ribbon options, too). Second, the assembler for a 24-pin monochrome printer in grey shades is already available (*BAU* April 1988) and can be adapted if anyone requires it. Third, the 'loss' in not using all 24 pins is not as

serious as it might seem.

The output from the 24-pin Citizen Swift-24, working in nine-pin mode was examined with a magnifying glass and results showed that each dot was produced by two adjacent pins (not three as stated in the manual). So 16 pins should produce two-thirds the ink density of 24 pins, and perhaps run faster too. However, the missing pins do leave very narrow horizontal white lines in coloured areas.

Finally, none of the detail available on a mode 1 screen is lost because one single screen pixel translates into many ink dots. Of course, the splendid quality of text printing obtained with a 24-pin printer, compared with a nine-pin one, is due to making full use of the extra resolution.

The programmed example uses double-density eight-pin graphics for which the VDU-coding is the same for all Epson-compatible printers, whether nine- or 24-pin.

The horizontal dot spacing is 1/60 on both the Canon nine-pin and Citizen 24-pin printers. The vertical dot spacing on the Citizen is also 1/60in, so squares on the screen become squares in the print.

However, the vertical dot spacing on the Canon, and other nine-pin printers, is 1/72in, so squares are distorted. Vertical dot spacing is fixed by the distance between the pins, but horizontal spacing can be changed.

Undistorted pictures can be obtained on a nine-pin printer by changing the horizontal dot spacing to 1/72in by using the single-density eight-pin 'plotter graphics' mode.

The code changes needed are:

```
380 D%=320
510VDU1,27,1,42,1,5,1,N1%,1,N2%
```

Lines 960 and 970 are deleted so each byte is printed once only. The code for moving to a different colour on the ribbon at line 410 is ignored by the monochrome printer, and need not be removed. The Canon printer produced the picture, now a bit smaller, in 30, rather than 42sec.

The 24-pin program of April 1988 reads the logic colour of a screen pixel into the accumulator A and translates it into the actual colour by referring to the palette at address &36F with the instructions:

```
TAY
LDA palette,Y
```

The coding used to translate screen colours into coloured inks in my program (lines 420-570) requires logic colours (0,1,2,3) to be specified, so those two instructions are not, in fact, present.

In the initial screen dialogue, the ink colours required to correspond to the logic colours have to be entered in order at the keyboard.

Ink colour 7 corresponds to white paper so no pass is programmed for it. Entering 7,0,3,4 would call for white paper, black ink, violet ink, yellow ink for logic colours 0,1,2,3, respectively, on the Citizen. To print just one colour at a time (as in colour separation printing with ribbon changes on a monochrome printer) requires, for example, the entry 7,7,0,7 to print just the pixels of logic colour 2 in the colour of the current ribbon. It is the position of the zero that indicates the logic colour.

£10 LARGE BINARY NUMBERS

This program from Eight Bits regular **Andrew Pepperell** will display a binary number on the screen (and printer if CTRL-B is pressed) in decimal. The program listing in the yellow pages, when typed in, will produce a machine code program called *Output*.

The main advantage is that it can work with over 16,000 decimal digits (and several hundred thousand binary digits). Unfortunately the large memory

demands of this kind of system mean that the binary number to be displayed must be stored on disc, but this does have the advantage of allowing many more digits than could be held in memory at once.

The full syntax is:

*OUTPUT <digits> <fname>

(<digits> must be in hex) and <digits> obviously refers to the number of digits to be considered in the calculations. This is included as there are situations where only a few digits are needed, and the less digits there are, the faster the program operates. <fname> is the name of the file containing the binary number.

This file should consist solely of zero and one bytes, with one byte per digit, although any non-zero value will be treated as a one. One thing to note is that the first byte of this file should be the lowest (in positional terms), and so 8 (1000 in binary) should be stored as 0001.

```
>*OUTPUT FFF BigNum
5357543035931336604742125245300009052807
0240585276680372187519418517552556246806
1246599189407847929063797336458776573412
5935726428461570217992288787347650706663
3358164771088978621235029550772499159555
5868178159180774290373549704650214113692
6875579378710154896779491048325606287553
369496891938570240000
>
>
>*OUTPUT FF BigNum
8527668037218751941851755255624680612465
9918940784792906379733645877657341259357
2642846157021799228878734765070666333581
6477108897862123502955077249915955558681
7815918077429037354970465021411369268755
7937871015489677949104832560628755336949
6891938570240000
>
>*OUTPUT F BigNum
6891938570240000
>
>
>
```

DISPLAYING BINARY NUMBERS IN DECIMAL

The program is an extension of a perfect numbers utility with which Andrew was experimenting, and it is in this field that its main use lies.

All perfect numbers can be expressed as ((2^n)-1)*(2^(n-1)), where n is a prime number. All of the numbers which fall into this set, when expressed in binary, have 'n' ones followed by 'n-1' zeros (this has to be reversed when creating the file).

As a demonstration, another program (*Perfect* on the monthly disc) will request a value for 'n', as per the above formula, and create a file which can be *OUTPUT. Possible values are 2, 3, 5, 7, 13, 17, and 11213.

Other uses would be to generate large powers of 2 (to generate 2^n create a file with n zeros followed by a 1), and prime numbers which can be expressed as 2^n-1 or 2^n+1 (to do this have a file of n 1's or a 1 followed by n-1 zeros followed by a 1 respectively.)

The program uses memory area from &1900-&3900 and &4000-&6000 as well as two pages of Ram at &900, and so it will probably corrupt the current program/document, and it should be run in mode 6 or mode 7 (or with shadow screen memory active). These two areas are for the current power of 2 and the current number respectively.

The program works by first clearing the above mentioned buffers, and then initialising the power of two buffer by setting the lowest byte of it to

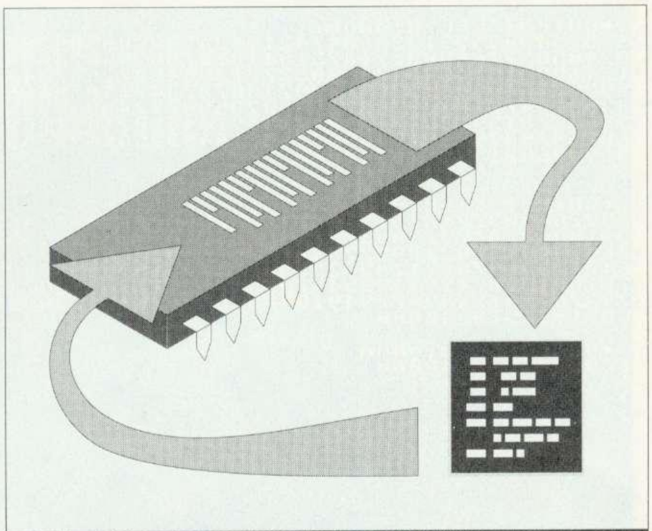
1. BCD is used to allow output in decimal rather than hex, but 1 remains the same in both numerical systems. Then, a byte is read from the file, and if it proves to be the last (carry set from OSBGET) then the file is closed, and the number output and control is passed back to Basic.

Otherwise, if the byte was a 1 then the current power of 2 is added to the current number and then the stored power of 2 (itself being anything up to 16,000 digits in length) is doubled by adding it to itself.

It is necessary to keep this power of 2 synchronised with the number of the byte read from the file.

This is so that the latter process is carried out regardless of whether the byte read from the file is a 1 or a zero.

After this, the loop starts again. When printing the number, all leading zeros are stripped and so no preceding noughts are displayed.



SPIRIT YOUR PROGRAMS AWAY TO SIDEWAYS RAM

£10 BASIC AND SIDEWAYS RAM

David Holton of St Albans has written a useful utility which will archive a Basic program direct to sideways Ram, and then reload it back into main memory.

The most useful application of this is when you are in Basic in the middle of the program, and wish to load another program, or temporarily enter *View*, and then reload your program. Normally, you would have to save your work to date on disc, and then reload it. This is all very well, but what if you don't have a work disc to hand, or the wrong filing system is selected.

A much quicker and neater way for sideways Ram owners is to 'park' the program in sideways Ram, and this is what David's *KopyKat* utility does.

To install the utility, type or load in and RUN the utility. It will install itself in a sideways Ram bank. After installing the utility in a sideways Ram bank, press CTRL-BREAK to initialise the system.

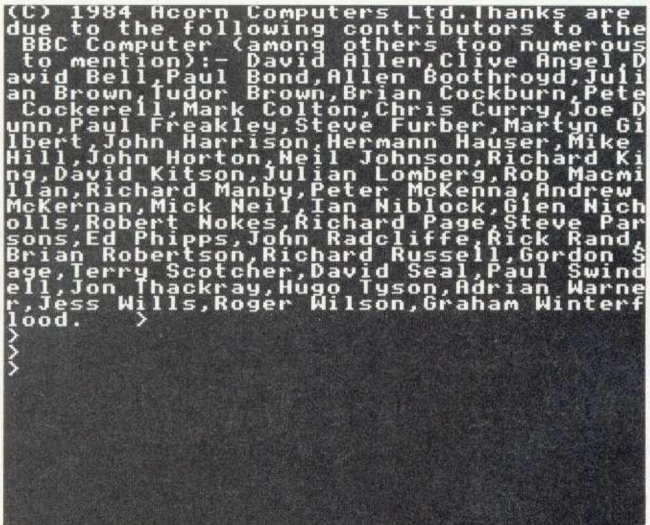
Say, for example, you are in the middle of a Basic programming session, and you wish to quickly pop into *View*, or load another Basic program, just to have a look at it, and then quickly return to your original program. To save the program into sideways Ram, type *KKS followed by RETURN. The program will be copied into sideways Ram.

You can now load another

program, clear out the memory, press CTRL-BREAK, run another Rom program, such as *View*, *Wordwise*, or whatever, and then when you want to retrieve your program, simply get back to the Basic prompt, and type *KKL. Your program will be reloaded into memory instantly, and you can carry on working.

The program works by using one Sideways Ram slot to store both the *KopyKat* software and the program it is storing. The *KopyKat* software uses 0.25k of space itself, therefore leaving 15.75k of space for the program. It is not possible to store a program longer than this.

After typing *KKS to save a program, one of two single character messages appears. An asterisk (*) reports a successful save to sideways Ram, and an exclamation mark (!) reports that the program was too long and would not fit in the sideways Ram buffer. After typing *KKL a hash character (#) reports a successful reload.



THE 'SECRET' LIST OF ACORN AGENTS

The program works by simply copying the Basic program data calculated using the system settings of PAGE and TOP into the sideways Ram area, and then recalling it from this area back into the main memory area from PAGE. The program assembly uses the SRWRITE command, supported in the Acorn 1770 DFS, and also in the Master 128. If you are using other sideways Ram systems you may have to alter this part of the program.

David has also written another little program called *Reveal* which prints out the 'secret' list of names in the BBC Operating System Rom.

The three pages (768 bytes) of memory from FD00 to FEFF are mapped to the BBC I/O ports, and the Rom area which corresponds to this address is never used, therefore Acorn decided to fill it up with some Ascii text listing the names of the people who worked on the development of the BBC micro.

This program switches out the memory mapped I/O and copies the names out and displays them on screen. (Note that this program does not work on the BBC model B).

We welcome all contributions (with or without listings) on topics of interest to eight-bit Acorn users. Please send your hints and tips to: David Atherton, *BAU*, 20-26 Brunswick Place, London N1 6DJ.

THE WORD IS OUT

Puzzled by jigwords? **DAVE LAWRENCE** provides the solutions with a clever program for the Arc and Beeb

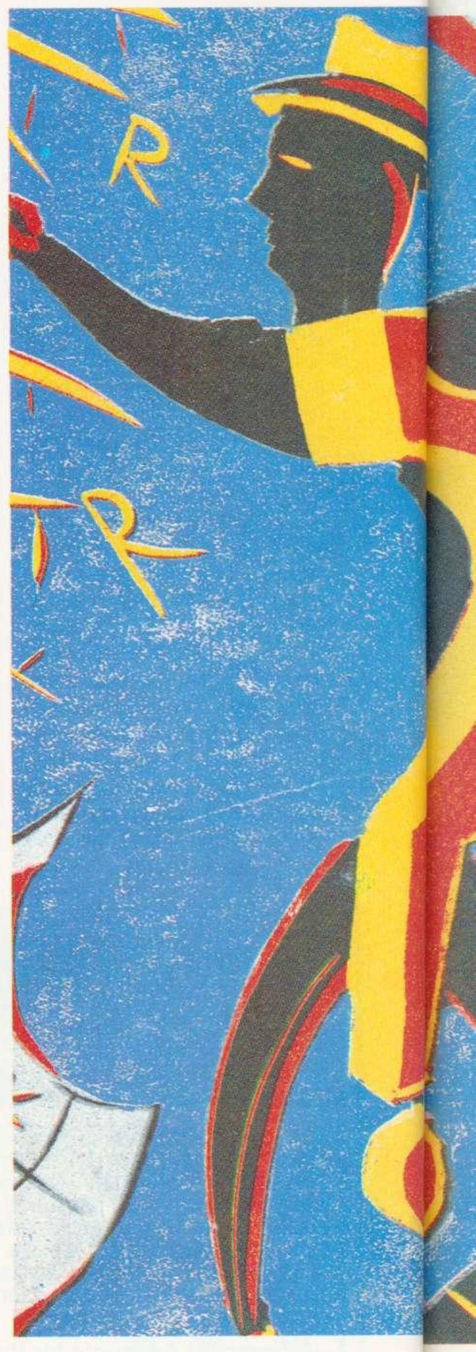


Illustration by Andrew Kulman

Having written two programs last year for *BAU* on word games and artificial intelligence, I thought it might be fun to combine them. So out came all the puzzle books and magazines again to see what would be a sensible puzzle to tackle.

Most published word puzzles are based on a crossword-like grid, but I was looking for one that didn't require any prior knowledge (eg, a dictionary) or a super-human brain to decipher the clues. This cut out a crossword solver and a 'letter fit' solver, but left jigwords. Here you are given an empty crossword grid and all the words that go in it, but no textual clues – it is up to you to put the words in the right slots (see the example opposite). This seemed an ideal word puzzle to automate, since the computer only needs to be given the layout of the grid and the list of words to try and find the solution.

Before diving into the program, have a go yourself at my example, and try and think about how you should be solving it. I went through three different methods (all wrong!) before settling on the algorithm the program now uses.

USING THE PROGRAM

At this point I have to make two quick apologies. The first goes to eight-bit users. I originally wrote the algorithm on an Archimedes and used the structures of Basic 5 and the ability to pass arrays to procedures. I then converted this to Basic 2 – unfortunately, this makes the eight-bit version trickier to follow. For this reason, the 'how it works' section below follows the Basic 5 version.

The second apology goes to 32-bit users for not making the program Risc OS compatible. There didn't seem much point in tripling the length of the program just to make it run nicely from the desktop.

If you look at the end of the relevant program on the yellow pages, you'll see two sets of data for the example opposite.

The first set of data is the wordlist terminated by the special word 'end' (this is, of course, used only as an end mark and does not appear in the jigword!). The second set consists of two numbers representing the width and height of the grid, followed by a character description of the grid layout.

White squares are represented by dots and black ones by hashes. For the moment, just use the example data, but if you want to solve a different jigword, simply change these lines of data as appropriate. If you want to solve a grid that has a 'hint' in it, ie, a word already entered on the grid, put the word in the wordlist as usual and also put the word in the grid layout in the appropriate position.

When the program is run, it first displays the grid on the screen, and then fits words into the grid until it either gives up (having not found any solution) or until it manages to completely fill the grid, in which case you hear a beep and it displays any words left over after filling the grid. Press SPACE to ma ke the program continue. If the algorithm ever reaches a 'dead end' and can't fit any words, it will remove one or more of the previous words and try again.

Once the program has run, you will find three new files on your disc: Answers, Clues and Info. Answers contains a textual representation of any solutions found by the program. Any unused words are also listed, ie, whenever the program finds a solution, it dumps it into this file. The Info file is slightly more interesting and keeps a record of how the solutions are reached. It shows you in what order the words are fitted into the grid and where they are fitted.

Indentation is also used to represent how well the program is progressing through the puzzle (there is a better reason why it is indented, but more of this later). When a solution is reached, its number is included within the Info file and you can refer to the Answers file to see it.

You need to look at the Clues file to see where the program means when it says '12 Across', for example. This file contains yet another textual representation of the grid, but this time with 'clue numbers' on it. These are placed on the grid wherever a word can start, either across or down, as in a conventional crossword. These are not directly used by the program in any other way except within the Info file to help you identify word positions.

If you don't want these files generated, simply remove the filename from the relevant FNopenfile instruction near the start of the program. Do not remove the line completely – just change the line to FNopenfile(""). You can also switch off the screen display by changing 'display' to FALSE.

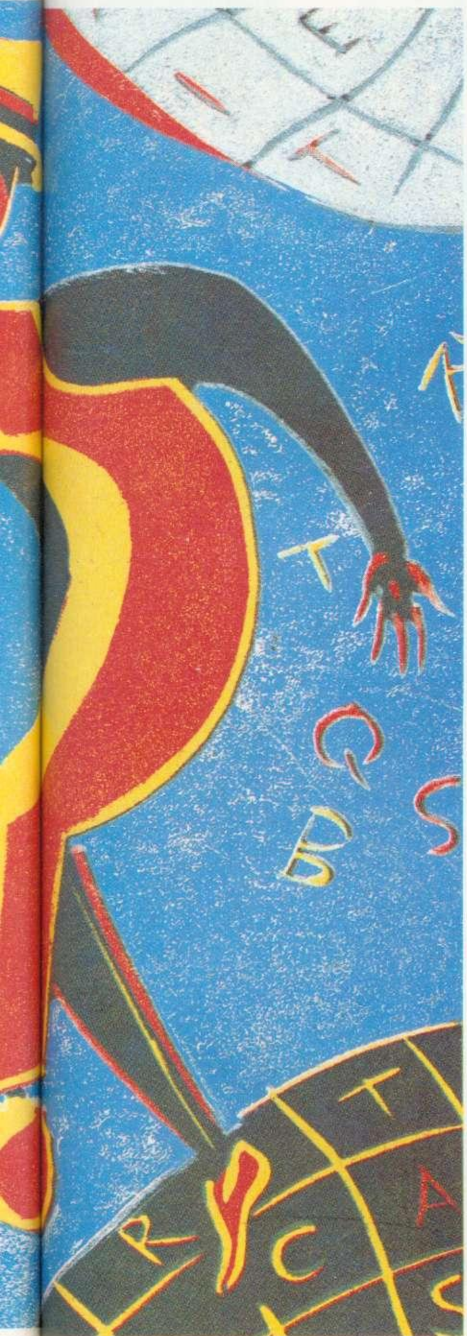
As always, if you are merely interested in using the program, or have a fear of algorithms, you can stop reading now. The rest of this article deals with all the little twiddly bits that make the program tick!

HOW IT WORKS

Please note, in this description, I use the word 'clue' to mean any blank slot on the grid in which a word could be put.

Even though I had four attempts at getting this program working properly, the basic idea of each method was the same. I needed a procedure (PROCsolve) that could be given a grid and a wordlist, would pick a word from the list and put it on the grid and then recursively call itself with the new grid (with the word on) and the new list (without the word).

The procedure would keep a track of how many clues were left on the grid and, when there



were none, it would print the grid out. Having a recursive procedure would mean that, having returned from a recursive call, the word could be automatically removed and discounted from further consideration at that position.

This produced a very neat solution to the problem and it also lead to the indentation used in the Info file. But choosing the right word for the right clue at the right time proved to be rather tricky.

PROCsolve is by far the biggest part of the program, so rather than plough straight into it, I'll explain some of the other routines.

After opening any necessary files with FNopen-file and initialising some constants in PROCsetup, PROCreadwords is called to count and read the wordlist into an array. Throughout the program I use variables with capital letters to indicate global variables – for example, the Words$() array that holds the wordlist and Words that contains the number of words read. A number of other arrays are setup here:

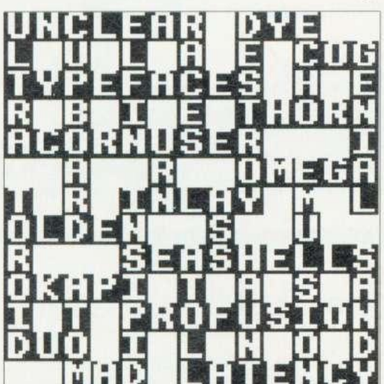
words$()	the wordlist
x() and y()	co-ordinates of clues
len()	length of clues
dir()	direction of clues, eg, 0=across, 1=down
names$()	textual names of clues, eg, '4 down'
lengths()	number of words for each length

Having read the words, the grid is then read into the global array Grid$() by PROCreadgrid. After this, PROCfindclues is used to find the co-ordinates, length and direction of the clues within the grid. Note that the Grid$() is actually two bigger in each direction, so that a border of black squares ('#'s) can be added round the edge to facilitate the detection of clues near the edges of the grid.

Finally, PROCshowgrid is called to display the initial (usually empty) grid. PROCsolve is then used with the global variables Grid$(), Words$() and Clues (the number of clues in the grid) to solve the jigword.

HOW PROCsolve WORKS

After declaring some local variables, the value of Clues is checked to see if the grid is full. If it is, then the screen and the appropriate files are updated. If it is not, the rather nasty looking algorithm between bestfit = 1E38 and IF fits = 0 THEN is employed to work out what should be done next.

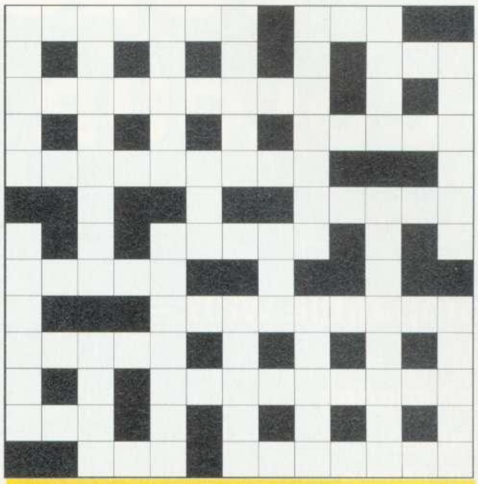


NO PEEPING NOW!

In essence, it goes through each clue free on the grid IF len(clue) > 0 and for each one goes through the wordlist and sees which ones are the right length IF len = len(clue). For those that are, it then uses FNmatch to count how many letters already in the grid coincide with letters in the word.

If there are no clashes (the function returns -1 if there is a clash), 'fits' (the number of words that fit in this clue) is updated and fits$ has the word number added to it. (This is a seriously nasty bodge, but gets around the problem of not knowing how big to dim an array!).

Once all the words have been checked for a given clue, if any of them fitted IF fits > 0 THEN, a number of tests are carried out to see if this would be the best clue to try and solve so far.



3 LETTER
ASS COG DUO DYE
MAD URN

4 LETTER
ATOM ECHO

5 LETTER
ATOLL ELFIN HAUNT
INLAY OKAPI OLDEN
OMEGA RACES
SANDY THORN
ULTRA

6 LETTER
GENIAL TOROID

7 LETTER
DESTROY INSIPID LATENCY
UNCLEAR

8 LETTER
CUPBOARD EMULSION

9 LETTER
ACORNUSER PROFUSION
SEASHELLS TYPEFACES

These tests find the longest clue with the highest number of letter matches, but with the lowest number of words that fitted. This is repeated for all clues unless a clue is found in which no words fit. If this is the case then the 'No words fits...' message is output to the Info file and the procedure exits (normally back to the last level of recursion). Otherwise, you have 'bestclue' containing the clue to use and bestfits$ containing a string of the words to try in it.

The last part of PROCsolve simply works through the bestfits$ list, removes each word of the list words$(word) = '', marks the clue as used len(bestclue) = 0, puts the word in the grid with FNput (this function returns what the old contents of the grid was) and then calls PROCsolve for the remaining grid. On return, it reinstates the word into the wordlist, marks the clue as used again and puts the old contents of the grid back.

SOME THINGS TO TRY

Feel free to type in some jigwords from magazines for the program to solve. If you want to really test the program, try adding some extra words to its list, or even slightly changing or removing some.

In the latter two cases you might be amazed at how soon it works out it can't actually solve the grid. Likewise, if you add a few extra random words, it tends to just ignore them completely. Adding similar words can delay it a bit, but not seriously. For example, try adding USURPER and UNPROVEN to its list – you may notice that these two could possibly fit as alternatives for UNCLEAR and CUPBOARD (apart from the clash with the D of OLDEN). The program merely starts somewhere else on the grid and doesn't even bother with the new words.

Watch future issues of *BBC Acorn User* for a letter fit solver and possibly even a crossword compiler and solver!

HOUSE PROUD

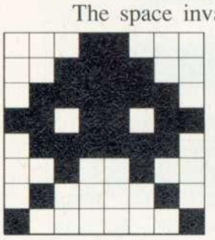


Having mastered the drawing techniques offered by Draw, we now illustrate the uses of the A3000's Paint application

We have already looked at *Draw* and seen that a drawfile is made up of various lines and curves – it's like a line drawing. I shall now explain the concept of a 'sprite' and how you can create and edit them with *Paint*, the sprite editing application.

Imagine a grid of squares. Tell you what, to save you a little brain power (because you'll need that later) I've included one for you.

The space invader (yes that's what it is!) is made up of black and white dots, known as pixels. That 8 × 8 grid of pixels is a sprite. This particular sprite will always be 8 × 8 squares so if you scale it up it will look more and more blocky. If the sprite were a mile square then each pixel would be an eighth of a mile wide.



A sprite can have any number of pixels across and up (memory permitting). The space invader sprite consists of 64 – a sprite of 640 × 512 is made up of 327680 pixels!

Using *Paint* you can colour each pixel to make up a picture.

Now, it would take a long time to build a picture by colouring pixels one by one so *Paint* provides tools for colouring large areas in one go. Circles and lines can be drawn on the sprite. But, in contrast to *Draw* where the circles and lines can be edited by selecting them and pulling their ears, the circles and curves in *Paint* can't – you can only paint over the top of them with another colour.

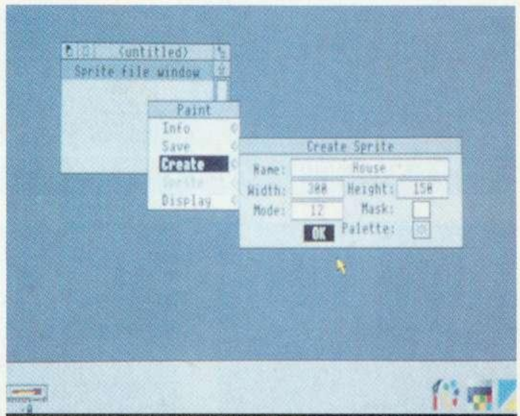
And that's all a painting package is. No matter how complicated it may seem, all it does is colour pixels and allows you to save them to disc as a sprite.

CREATING SPRITES

Load *Paint*, click on its icon on the icon bar to activate it and press Menu over the spritefile window that pops up. Moving over the Create submenu allows you to set up a new sprite.

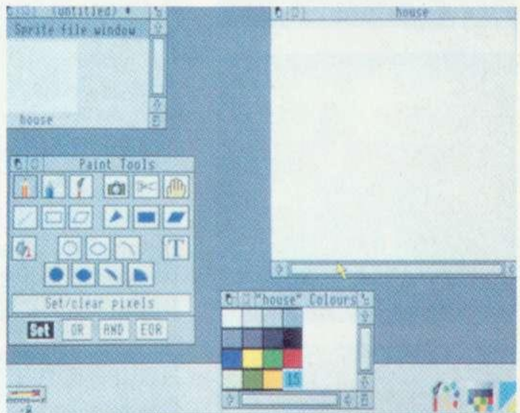
When creating a sprite you first have to give it a name. We – or rather you – are going to draw a house so type House and press RETURN.

You now have to give the sprite's size in pixels wide and pixels high. Our sprite is going to be 300 high and 150 wide so type in these numbers, remember you can use CTRL-U to delete what's in the box already. Make sure the Mode box reads 12 and the Palette option is on and then click on OK. The House sprite has now been created. You may ask why, if there are twice as many pixels across, the sprite looks square. This is because, in mode 12, the pixels are in fact rectangular – they are twice as high as they are wide.



CREATING THE HOUSE SPRITE

Different modes have different resolutions (pixels wide by pixels high) and different numbers of colours. For example, mode 12 is 640 × 256 pixels with 16 colours. Now try mode 2 (use the editable field in the Mode submenu of the Palette icon). See how everything is shown with less detail? This is because there are fewer pixels: mode 2 is only 160 × 256. The pixels are much wider than they are high. Mode 9 has pixels that are square (320 × 256). Risc OS automatically scales sprites so that they appear as close as possible when they are displayed in their native mode.

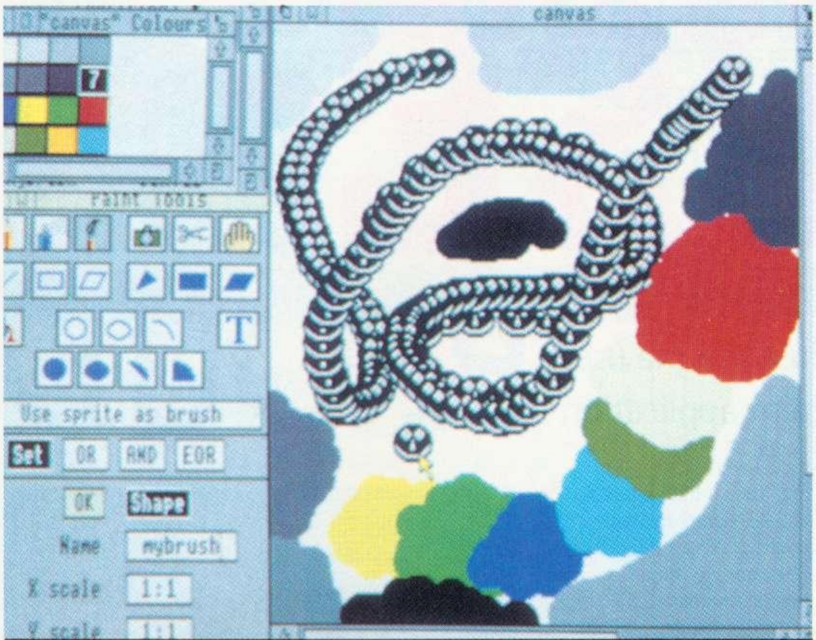


REARRANGING THE WINDOWS

Paint can deal with several sprites at once and the spritefile window shows you all the sprites you are currently editing in 'Picon' format, ie, the sprites are not shown real size, just as a pictorial guide. To edit a sprite, double click over it. When you do this *Paint* will bring up the sprite editing window with the name of the sprite on the title bar. In this case it's House.

Press Menu over this new window and move over the Paint submenu and choose Show colours and Show tools (press Adjust on Show colours and then Select on Show tools, remember Adjust leaves the menu on the screen). This makes two new windows pop up – the colour palette for the sprite and a selection of painting tools. Rearrange the four windows so that you can see all of them clearly – this should be getting to be a habit by now!

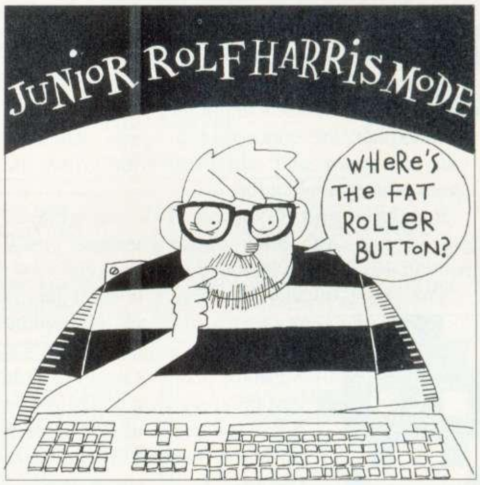
For the moment forget about the Spritefile window, it's not that important until you want to

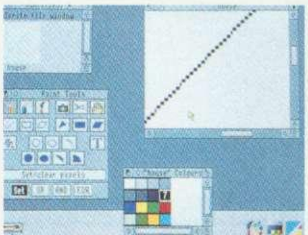


PAINTING WITH YOUR BRUSH

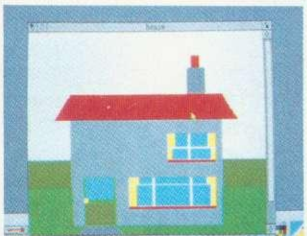


PAINT YOUR OWN ARTWORK

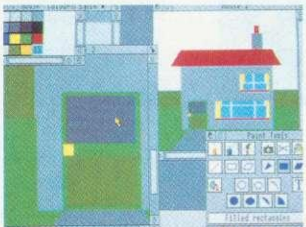




A LINE OF RECTANGLES



TRY DRAWING THIS HOUSE



USING TWO VIEWS

save your sprite or create new ones. Don't try to close it though!

Choose Black from the sprite's palette and then choose the Line tool (below the Pencil tool in the top left of the tools window). Move the pointer over your sprite editing window and press Select, stretch the line out, and then press Select again. A line is drawn in black pixels. To see that the line is really made up of small rectangles, zoom in on it to 4 : 1 using the Zoom submenu. If you select the Pencil tool you can set individual pixels to the chosen colour with Select, or change them to white with Adjust. In fact you can use any of the painting tools at any magnification.

Zoom the window back down to proper size (1 : 1) and clear it by choosing the Fill rectangle tool (the one beneath the Scissor icon), changing the plotting colour to white, pressing Select in one corner of the sprite and stretching the rectangle over it. Now simply press Select again to plot the rectangle.

HOUSE RULES

For your next exercise draw the house shown here. Leave the sky white and only the one window on the top floor for the moment. Use only the second row of tools down (it's easy, I did it!). The white box in the Tool window will tell you which tool you've selected. Don't forget you can zoom in on the sprite, and this will make drawing it easier. You can also have two or more different views on the sprite (like with *Draw*), just double click on it in the Spritefile window again.

Now you've drawn your house, the next thing to try out is Copy block (the Camera tool). If you choose this you can select an area to be copied to another part of the sprite. Now let's give the house another upstairs window – choose the Camera tool, press and hold Select over one corner of the existing top floor window. Stretch out the rectangle to surround it and release Select. Now move the box you've cut out over the place you want the new window and click Select. Voìla!

Move block (the Scissor icon) does just the same, except that the original area is cleared to white after the block is copied. The scissors remove the original, the camera copies it.

Notice that when you use either of these icons there are two options at the bottom of the Tools box (ignoring SET, OR, AND, and EOR) – Local or Export. Local means that all copying actions will be restricted within the sprite. When you click on Export you can save the selected bit to disc, or into any other application that accepts spritefiles – *Draw* for example. When you use Export, a Save box will pop up; drag the Spritefile icon to where you want the sprite to go, be it a directory viewer or another application such as *Draw* or *Paint* itself. Try it.

Select an area with the Export option and drag the spritefile back onto the Spritefile window (you'll probably have to resize the window to see it). You should now see two sprites – the whole house, plus the little cutout section. You could also try loading *Draw* and dragging the Save box from *Paint* onto a *Draw* window, the sprite is now a *Draw* object. Running *Paint* and *Draw* together in this way is what 'multi-tasking' is all about. Later in the series you will learn how to use *Paint*, *Draw* and *Edit* together to produce simple documents.

Tidy your desktop by quitting *Draw* (it will ask you if you are sure because there is an unsaved file. You don't need this, so click on Yes). Delete the cutout sprite from the Spritefile window (by pressing Menu over it, moving over the Sprite export submenu and choosing DELETE). Then rearrange the windows nicely.

At the moment the sky is white. To change it to a more sky-like colour, like blue, choose the Fill tool (the dripping paint can). Select blue and click over the white sky. This tells *Paint* to perform a flood fill, ie, change all the pixels in the area of the colour under the pointer to the new colour.

Using the flood fill you can make your house picture any colour you like, although changing neighbouring areas to the same colour will mean that they are merged together permanently. Remember *Paint* has no objects, just pixels, so if both walls and roof are red, *Paint* can't tell them apart ever again.

Save your finished house to your Graphics disc and clear up the desktop.

BRUSH STROKES

Another tool that you'll find useful is the Brush. This will allow you to 'paint with another sprite'. The Default brush sprite is called 'Brush' (funnily enough) and is the one that is used when you first load *Paint*. If you click on the Brush icon you can paint with this default brush. However, this isn't terribly useful until you click on the Shape button and then OK.

If you want to create your own brushes start up another spritefile – by clicking on the Paint icon – and create a sprite called MyBrush of 31 × 17 pixels, making sure both Palette and Mask options are on. A mask is a special transparent colour that you can paint in. When a pixel is painted in a mask colour it means that it is transparent – dead useful for creating brushes with outlines of an irregular shape.

Bring up the editing window of the MyBrush sprite, the tools and its palette (each sprite has its own Palette menu). You might have to resize this window to see the mask colour, it's the one that sticks out of the bottom. Draw a circle (you'll have to enlarge the sprite to at least 9 : 1) in black, don't forget this sprite only has 31 × 17 pixels so the circle will appear, well rather blocky. Another tip, to get the centre of your circle in the centre of the sprite use the Grid option which outlines each pixel in the chosen colour. Drag out the circle and if it doesn't touch the sides, use the Adjust button to reposition the centre.

Using the Pencil tool, colour all the white pixels to the mask colour (you can do this with the Flood fill option set to Global).

Watch the Spritefile window as you make the pixels transparent. Finally you can draw a little face on the circle in white.

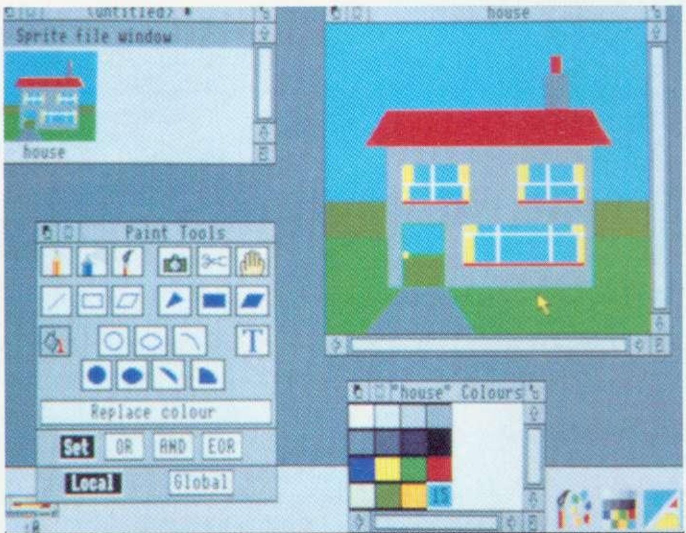
If you now create a large sprite, say 600 x 300 (you'll have to zoom it back down to 1 : 1 again) you can use this brush to paint on it by typing in the name MyBrush and clicking on OK. With the Shape option on *Paint* only uses the shape of the brush (all of the colours that don't have a mask over them), you end up drawing a series of circles. Switch it off and you can paint lots of smiley faces.

If you load your House sprite, you can even paint with that by setting the brush name to House. Make the windows of the house transparent if you want by choosing Mask in the Edit submenu to give the sprite a mask and colour the windows in the mask colour.

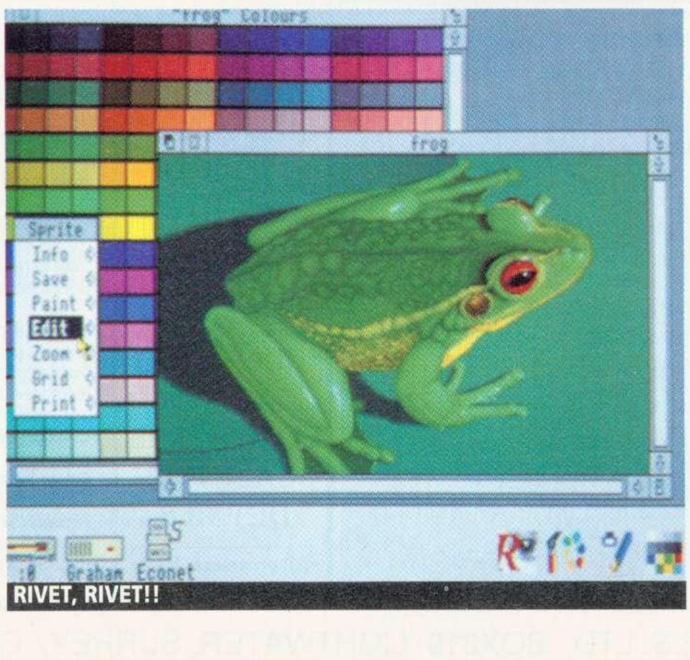
Experiment creating sprites in different modes. For instance mode 15 is a 256 colour mode. Sprites created in mode 15 will only look as they should in a 256 colour mode although you can edit them in mode 12.

Finally, I shall leave you with the picture of a frog (below) to show what you, and your A3000, are capable of. Look out next month when I shall be introducing *Edit*, the text editor.

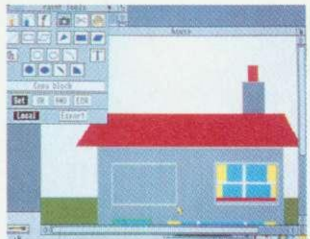
Paul James



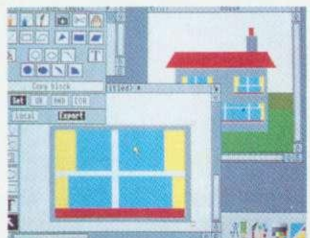
COLOURING THE SKY

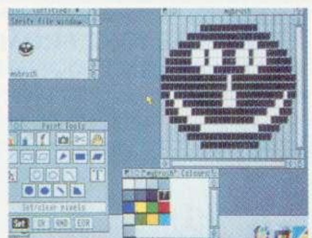


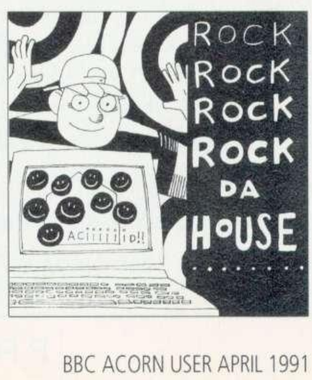
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ARCHIMEDES

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SHEETS AHEAD

CHRIS DRAGE examines how spreadsheets can contribute to the teaching of datahandling in the National Curriculum

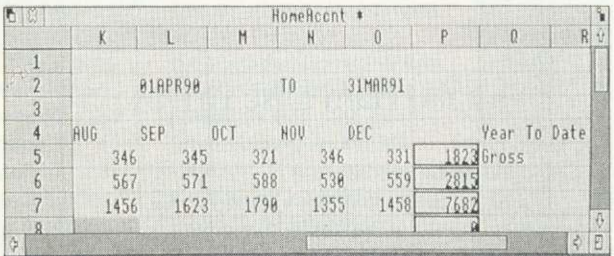


TABLE COMPILATION IN THE SCHEMA SPREADSHEET

Last month should have armed you with a few ideas and starting points about looking for software to address the handling of information within the National Curriculum.

Spreadsheets are essential tools in the commercial world and teachers are slowly accepting their relevance to education. However, they still tend to live in the shadow of wordprocessors and databases as their learning potential has not been so apparent. Yet in certain cases a spreadsheet can be more appropriate than a database, especially if the data under review involves changing numerical values.

The National Curriculum attainment target web that accompanied last month's column applies just as well to spreadsheets. Similarly, in many places where databases are mentioned in the programmes of study, some tasks could be better achieved using a spreadsheet.

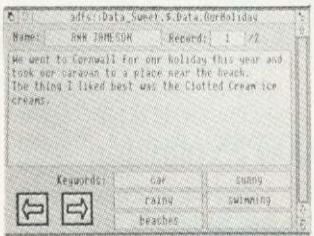
A spreadsheet is a table of information set out in rows and columns, similar to ledgers and transport timetables, which offers major advantages over the more traditional methods of compiling tables.

The class attendance register is a type of mechanical spreadsheet. As an electronic one it could, on a Friday afternoon, at the point when the last entry is made, immediately and automatically calculate the subtotals for am/pm, totals and average attendances for the week, term and year, number of school sessions that week, the maximum possible attendances and the percentage attendance. All this at the touch of a key!

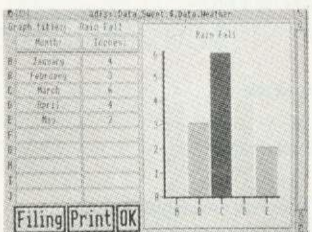
A spreadsheet, however, offers far more than this humble example indicates. It is one of the best all-purpose mathematical software tools currently available. Its range of applications can include modelling, investigations, number patterns and problem solving.

In educational terms, the value of spreadsheets lies in the collection and manipulation of data, the formulation of hypotheses and discussion of the results.

It may take some time before children begin



DATASWEET KEYWORDS



CHARTS ENLIVEN DATA



MAPS CAN BE INCLUDED

to accept the spreadsheet as a tool for their own use. They need to experience it in a variety of roles and situations – for example, as a program to accept data and display it in a graphical format and as a simple 'calculator' relevant to a project like weather, where the spreadsheet could be used to calculate Celsius to Farenheit conversions.

If a spreadsheet is set up to record children's personal data, it can provide some very interesting patterns and statistical information.

Results of a traffic survey recorded on a spreadsheet can lead to totals and averages for the numbers of different vehicles. The class 'mini-enterprise' leads naturally to developing spreadsheet models. Mathematical patterns like multiples, Fibonnaci sequences and so on can be revealed through a spreadsheet.

The many activities of the head, staff, governors and PTA can be efficiently handled with the help of a spreadsheet.

Further ideas and practical suggestions can be obtained from Roger Keeling and Senga Whiteman's *Simply Spreadsheets*, a really super guide to using spreadsheets across the curriculum. Beginning with activities relating to the topic of ourselves, the book contains many ideas for using spreadsheets in modelling, mathematical investigations and problem solving for children between the ages of eight and 14 years and it's an ideal choice for any inset relating to datahandling in the National Curriculum.

Which spreadsheets are available and what are their merits? Both eight- and 32-bit Acorn computers are well served by software.

If your school has a Master 128 then you already have access to *Viewsheet* as it is resident in the machine. This program is recommended as it can integrate loosely with the rest of the *View* family and has become the *de facto* standard for Acorn's eight-bit machines.

In addition, support for this software is reasonably good. Recommended are two guides from Medusa: *Guide to Spreadsheets* (A Tutorial) and *Spreadsheets across the Curriculum* (Examples for 11 to 18-year-olds). Based

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on *Viewsheet*, the former publication provides a lucid course on the mechanics of entering data and editing it, setting up sheets and tasks like replication and recursion. It is liberally illustrated with practical examples and exercises. The latter guide comprises a set of 10 case studies demonstrating the use of *Viewsheet*.

Another good tutorial is ESM's *Introduction to Viewsheet*. It too covers everything from building sheets to transferring files among the *View* family. To lessen the time taken to enter the examples, a disc is also available containing all the coursework exercises. This guide assumes no prior knowledge and offers a very good starting point.

For younger children two recommended spreadsheets are *Pigeonhole* (Northern Micromedia) and *Grasshopper* (Newman Software).

The former has been specifically developed as an introductory spreadsheet with the National Curriculum (key stage 3 and 4) in mind. It offers access to a spreadsheet format with only basic functions: totals/averages for rows and columns, sorting into numerical or alphabetical order and bar/pie charts. *Pigeonhole* is limited to 15 columns and 35 rows, presented in a style children can relate to and as on-screen instructions are available, little experience is needed.

Once the principles of datahandling using *Pigeonhole* have been grasped, children should rapidly move on to *Grasshopper*, a typical spreadsheet program with a number of additional characteristics which make it appealing to young children. It uses colour coding to indicate whether cells are labels, data or formulae. It is able to undo the last operation (useful to reinstate a spreadsheet when a cell containing several formulae is altered). Rows and columns can be formatted, sorted and printed out or graphed. *Grasshopper* is an ideal tool for key stages 2-3.

There are three useful spreadsheet programs available on the Archimedes/A3000. *Datasweet*, discussed last month, is ideally suited for introducing primary-aged children to datahandling. It comprises an integrated suite of very simple and attractive programs, one of which, *DataCalc*, is a spreadsheet. This is a tool that allows pupils to carry out statistical work on the data they have collected.

It is deliberately limited to six columns by 20 rows for ease of use. In true Risc OS style, a file can be dragged directly onto a blank sheet in order to load it. In addition, *DataCalc* has a number of characteristics that help children to understand the workings of spreadsheets – for instance, as each cell containing a formula is highlighted, it reveals its formula rather than the end-calculation which is more common. Formulae can be entered via a formula window which contains objects like 'x, +, - , /', 'sum' and 'average' or typed directly from the keyboard into the cell and help is always at hand.

The manual consists of well written, A4, photocopiable sheets which have the learner clearly in mind.

Pipedream is a spreadsheet/wordprocessor for the Archimedes/A3000, IBM/compatibles and the Z88 laptop. Its outstanding characteristic is the ease of transfer of files between machines running it, but undoubtedly its strongest feature is its comprehensive spreadsheet facilities.

Applications in school are far wider than is first apparent. For example, on the Z88 it can be taken on field work so that, after discussion in the classroom before the trip, data can be recorded on a suitable spreadsheet table as it is gathered. This data can be transferred directly to Archimedes *Pipedream* (including all formatting and highlighting) where final editing and presentation can be done.

Pipedream provides almost instant recalculation and updating of the figures so trends which may not be immediately obvious can be observed via the spreadsheet and 'what if..?' questions asked and answered. It also offers a flexible environment which allows consistency of development across machines. If you require a writing environment which can include calculations, then *Pipedream* is an ideal choice.

Quite the most powerful spreadsheet program for the Arc since *Logistics* (or *Lotus 123* under the PC emulator), *Schema* is capable of a wide range of tasks including financial analysis, 'what if..?' calculations, budgeting, cash-flow analysis, tabulating data and time calculations. This is the comprehensive, Risc OS spreadsheet we have been waiting for. It can run on a 1Mb machine and can handle quite enormous and complex sheets – a quoted maximum of 30000x30000 cells. Although this is, in practice, rather ambitious, *Schema* can simultaneously address a maximum of 50 separate sheets. Two address modes are available: the usual A1, A2, A3... notation or the R1 C1, R1 C2...(like Excel). Cells can take labels, numbers, rules, etc.

Nothing new there, but *Schema* begins to show its abilities when you want to perform operations, such as averaging. The system has a number of standard built-in functions which are special-purpose formulae that perform calculations. These certainly speed up formula entry. Thus, in place of (B1+B2+B3+B4+B5)/5, *Schema* allows you to enter Average(B1><B5). The range of such functions is quite extensive covering algebraic, string, time, financial, statistical, matrix and array functions.

In addition, *Schema* has a macro language resembling BBC Basic designed for use in the spreadsheet environment. Macros permit direct access to spreadsheets with the ability to generate interactive dialogue boxes, access graphic macros and provide a macro library which can be shared among spreadsheets. *Schema* can produce graphs of its data in two ways by using one or more of the nine built-in formats (pie, stacked bar etc) and changing entities like the scaling, axes titles etc, or by writing macros controlling the appearance of the graphs. A welcome Zoom option can magnify the graph to obtain a larger picture of the data.

Schema has been well designed with a number of time-saving short cuts like quick, draft printing, multi-line editing, multi-field sorting (by column or row) and *Lotus 123* import/export capability to name a few. In addition, its conventions make the whole thing immediately familiar to anyone conversant with Risc OS. *Schema* is a professional tool which will find many a financial and statistical role in the school office, but it is also well placed to take a wider role in the curriculum.

SUPPLIERS

- **Simply Spreadsheets, R Keeling, S Whiteman, KW Publications, ISBN 0 948048 05 0. £7.**
- **Guide to Spreadsheets and Spreadsheets across the Curriculum are available from Medusa, Bishop Grosseteste College, Newport, Lincoln LN1 3DY. Price: £10 and £7.50 respectively.**
- **Introduction to Viewsheet is available from ESM, Duke Street, Wisbech, Cambridgeshire PE13 2AE. Price: £21.50 (pack of five). Disc: £10.**
- **Pigeonhole is available from Northern Micromedia, NORICC, Resources Centre, Coach Lane Campus, Newcastle-upon-Tyne NE7 7XA. Price: £13.**
- **Grasshopper is available from Newman Software, Newman College, Genners Lane, Bartley Green, Birmingham B32 3NT. Price: £30.**
- **Datasweet is available from Kudlian Soft, Hampshire Microtechnology Centre, Connaught Lane, Portsmouth PO6 4SJ. Price: £30 (primary), £60 secondary.**
- **Pipedream is available from Colton Software, Broadway House, 149-151 St Neots Road, Hardwick, Cambridge CB3 7QJ. Price: £113.85.**
- **Schema is available from Clares Micro Supplies, 98 Middlewich Road, Northwich, Cheshire CW9 7 DA for the Archimedes series. Price: £129.95. (Education Price: £99.95).**



HAT TRICK

It's third time lucky for HatTrix. **BRYAN B CLOUD** gives a guided tour of the inner workings and advises on how to write a game of your own

HatTrix got off to a flying start in the January and February issues of *BAU*. Here are a couple of programs that allow you to fiddle about with the game without having to resort to machine code. The first is a screen designer, the second a sprite converter.

HatTrix is based around four 'screens' (playing areas) which are 80 characters wide and 124 high – roughly 20 times the size of the screen display (which is 16 x 32). Don't forget that you're in mode 2, so 16 x 32 is actually square!

The PlatPos file (imported when the game is assembled) contains all the data necessary to define the layout of the platforms in these four screens, so all you need to do to define your own screens is edit this file.

Try typing in *PlatEd* (on the yellow pages) and running it (first make sure that the PlatPos file is on the same disc). This will present you with a scaled down view of the first screen in the game with the various platforms represented by coloured lines (see figure 1).

You can view the other screens by pressing f1 to f4. The current number is displayed in the top right along with how many platforms there are on the screen and how many more can be placed. A cursor is displayed in the top left and can be moved with the cursor keys – pressing 1-4 will change its colour to match the various platform types.

To enter a new platform, press SPACE to fix the left-hand end; the width can then be adjusted with the cursor keys. Press SPACE again to fix the platform permanently and press ESCAPE to leave edit mode and remove the whole platform. (Note that you won't be able to add any more platforms to the first screen as all 41 have already been placed).

To delete an existing platform, position the cursor over it and press DELETE. Pressing CTRL, SHIFT and DELETE together is rather more drastic – it clears all platforms on the current level. To save any changes you make, press S, this will save the new file as PlatPos, ready for reassembly. Press CTRL-ESCAPE to quit the program and return to Basic.

To try out your own levels, make sure the new PlatPos file is on the disc with the *HatTrix* source code on it, then CHAIN "Hat0" to reassemble it. The game can then be run with *HatTrix as usual. Remember that once you have got *Hat0* to *Hat6* debugged, ie, when all the checksums are correct, you can remove the checksum routine.

PROCsave can be examined to see how the data is stored within the PlatPos file. Each screen has its platforms sorted according to their y co-ordinates – unused platforms have y set to 255, the rest have 32 added to them to allow for the top wall in the game. Three tables of 41 bytes are then written for each screen: first the y positions, then the x positions, and finally a byte consisting of the platform type in bits 0 and 1, and the width in the top six bits. Each table is terminated by 255.

As you may have discovered, the sprite converter only works on an Archimedes. There is a very simple reason for this: I designed all the sprites in *Paint* and wrote this converter to convert the data into BBC format and save the graphics files. Figure 2 illustrates the sprites used by the game and this file can also be found on the monthly disc.

If you want to create your own sprites, either get hold of the disc and edit mine, or create a sprite file (called Sprites) and create the sprites shown in figure 2.

GUIDED TOUR

Having told you how the positions of the platforms are stored, I can now reveal how the game works out if the spring has hit one. Two routines are used: .initcheck and .checkarea. Both need the x and y co-ordinates of the square to check what's stored in the zero page locations x and y. .initcheck is called first (eg, .redrawbottomedge in *Hat3*), which looks through the y co-ordinate table for this level (yptr, xptr and tptr are set at the start of each screen).

If one is found with y co-ordinate y, its number is stored in tempy. Subsequent calls to .checkarea don't then need to look through the whole table. .checkarea starts from the value in tempy and checks if there are any platforms that coincide with x. If any are found, the platform type (the bottom two bits of the type table, remember?) is returned (with 1 added, ie, values

Clive Goodyear

1 - 4) at .isaplat. If no platform is found, the hat list is checked through to see if (x,y) contains a hat – if so, the hat number is returned (with 5 added) at .isahat. If the square is blank, 0 is returned.

The hats caused me a bit of a headache when I tried to plot them. .checkarea and the various routines to plot the edges of the screen were all geared up to plotting graphics 8 x 8, and no matter what, I could not persuade them to plot a 16 x 8 hat without a lot of rewriting.

Then I remembered that old adage: 16 = 2 x 8, and realised I could plot two half-hats, both 8 x 8! .checkarea therefore returns two numbers for a hat, so 5 means the left of hat 1, 6 the right, and so on.

BOUNCING

Gravity and bouncing are both surprisingly easy to deal with. Gravity is achieved by having an increment value for the y co-ordinate of the spring. This value starts negatively and in proportion to how long a jump key is held down for. It is then added to the y co-ordinate each frame. But it is incremented at the same time, causing the spring's upwards motion to slow.

When it reaches zero, the spring is at the top of its arc and subsequent incrementing will cause the spring's y co-ordinate to increase, thus making it 'fall'. A check is needed to stop the spring falling too fast and overtaking the scrolling. All this can be seen in *Hat1*, starting at .inair, and this routine also deals with bouncing.

About 20 lines after .inair, a JSR lookbelow is used to see if the spring is about to land on anything. If it's a hat, killhat is used to remove the hat and give you some points (see below). If there's nothing there, control passes to .notoccl, otherwise it sees if a bounce is needed.

Firstly, hcy is set to zero to ensure that the spring starts the bounce as if it was exactly sitting on the platform. dy and dy+1 contain the low and high bytes of the spring's 'gravity increment', which is initially halved (the LSR and ROR). The x register is then examined to see what sort of bounce is needed.

Platform 3 has 'half' bounce, so nothing further is needed. Platforms 1 and 4 have 'quarter' bounce so a further LSR and ROR are used. Finally, platform 2 is the super-bouncy ice block, so this quarted value is multiplied by three to get a three-quarter bounce and dy and dy+1 are negated by the JSR reverse after .bounce to make the spring go back up.

CREATING AND COLLECTING

As I mentioned in the first *HatTrix* article (*BAU* January), removing a hat from the screen is non-trivial and most of the .killhat routine (from .nomoretime) is dedicated to calculating the screen address of a hat. The code before this point makes the hat collecting sound and adds the relevant points and time to your status.

.placehat, the opposite routine to .killhat, can be found in *Hat4*. This finds an unused slot in the hat list, then picks random x and y co-ordinates and puts these in the table. The cunning bit of this code is ensuring that the picked position is not already occupied (another use of .checkarea) and also that it is not somewhere on the displayed screen. This means you don't have to use code similar to that in .killhat to plot the new hat!

All the random numbers needed in the game are generated using the standard ring counter technique. This is initialised at the start of each game by reading the system clock to make the game different each time. Calling .rand is then used to generate a random number between 0 and 255.

Most of *Hat5* is taken up with the routines needed for dealing with the highscore table. .checkscore is called at the end of a game to see if your score needs to be put on the highscore table. If it does, it works out what rank you are and moves all the names and scores below you down one rank (.movename, etc).

The code after .iloop is a fairly standard input routine that displays a cursor and accepts key presses including DELETE and ESCAPE. After accepting a name, code after .return is used to see if you actually typed anything. If you didn't, it reinstates the name you knocked off the bottom of the table!

.showhst is used to display the names and scores in the table, this should be fairly easy to follow. The rest of *Hat5* consists of string and number printing routines. The base routine .putc is used to print a character on the screen. .writec calls .putc but then uses VDU9 to move the cursor on. VDU31 moves the cursor to any tab position and VDU17 changes the text colour. .writes is more complex, and will write out a string including text, tabs and colour changes.

The final routine in *Hat5* is .decimal. This is the most concise way of converting a number into decimal. It first came from Jeremy Ruston's book, *Inside the BBC Operating System.*

All sound in the game is generated by calling .sound with the pitch in A and the 'sound number' in X – these are in a table starting at .sounds in *Hat6*. This first checks the value of soundflag to see if sound is on or off.

GAME GUIDELINES

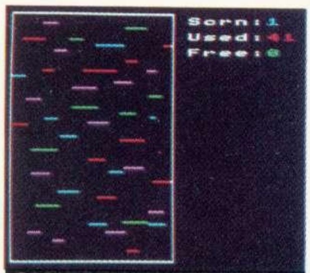
Seeing a finished game is often quite daunting – how and where do you start? Well, I hope *Hat-Trix* has given you an idea. Now you've seen the full game, go back and have a look at the demo version and see where I started. Begin simply by plotting your sprites, then try and move them around and update the screen.

Move on to some elementary game play and control, but don't worry too much about loose ends – it's perfectly okay if the game exits back to Basic and you have to run it again. Now you can move on to building up the various levels and screens that make your game.

Unless sound (or a tune) is a fundamental part of the game, don't even bother with it until the end – in most cases it would drive you mad if you added it in too soon. Finish off by adding scoring, a proper highscore table and other little tweaks like a pause mode, key defining screen or permanent disc-based highscore table.

Always include various cheat modes for testing purposes. For example, one that increments your score is useful for testing score wrapround, and seeing if your highscore 'shuffling' works.

I hope this has given you some hints on how to write a game. Have a go, it's not that tricky – perhaps *you* could write the next *BAU* game.



GAME DESIGNING TRICKS



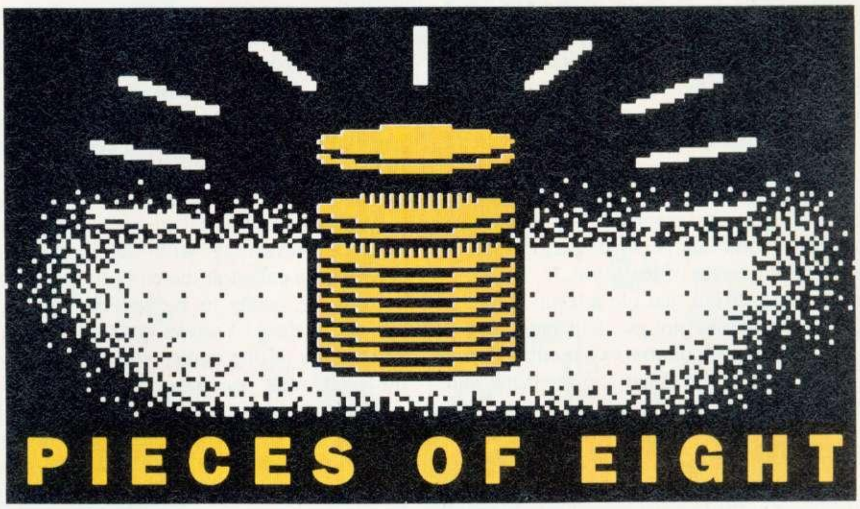
SPRITES FROM THE GAME

FIGURE 1

Key	Colour	Platform type
1	Red	Wall
2	Cyan	Ice block
3	Magenta	Girder
4	Green	Creeper

FIGURE 2

Name	Number	xsize	ysize
spring	5	12	16
girder	4	8	8
hat	8	16	8
clue	9	8	8



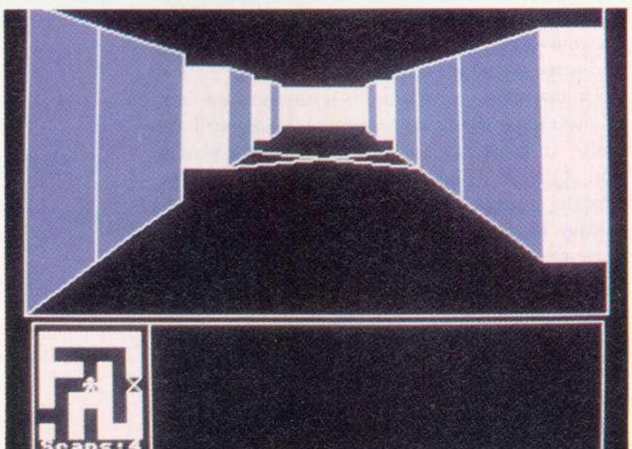
GET OUT OF THAT

PAUL JAMES continues his classic Beeb series with a second delve into an a-maze-ing program and unravels fractal formulae

Mazes have always been a source of both fascination and frustration. Back in *BAU*'s 50th issue (September 1986), **Dave Lawrence**'s *Maze* game made an appearance.

Consisting of a random maze, which is drawn in three dimensions around the player, you not only have to find the exit, but find the treasure.

Once you've typed in the program (or loaded it from the monthly disc) and run it, the computer constructs a new maze. Progress is shown by two arrows and it can take some time, so don't worry if it seems to get stuck. When the arrows finally meet, the maze is complete and you are placed in a position along the north wall.



WITHIN THESE WALLS LIES BURIED TREASURE

You can move around using the standard direction keys: Z and X for rotating left and right, ';' to move forwards and '/' to turn 180 degrees. The maze is redrawn each time you move and, to speed up the redraw, you can turn the wall filling off by pressing F – although Dave recommends you don't do this because the colour of the walls can help with navigation.

Another navigational aid is the chalk, which you use to mark a cross on the square you are standing on. Dave suggests you mark the corridors that have dead ends so that you know not to go down them again. But don't over-use this, since it can be more of a hindrance than a help.

Yet another help is your radar (rather fortunate you have a dish on your head isn't it!). Pressing S will scan the area you are standing in, showing surrounding walls.

You can only use your radar six times in any one game, after which your battery runs out. However, this should not be too hard to change (try the S% variable).

When you have found the treasure (why else would you enter a maze?) make your way to the exit. Trying to leave without the treasure results in your being told, in no uncertain terms, to get back in there and find it.

The maze is constructed by setting aside an area of memory and filling it with walls. The starting point is then chosen and a line traced through the maze. The following rules apply to make sure the route is contained within the maze and that progress is not made too easy:

.start	Set the initial X and Y values
.choose	Choose a random direction (North East South or West) Adjust X or Y depending on direction chosen, ie, if south was chosen then subtract 1 from Y If the new square is outside the maze then choose another direction. If the square has already been visited then go to **jump** Turn the last and current square into a corridor corresponding to the direction chosen. If all squares have been visited then the maze is finished, go to **end**, otherwise return to **choose**
.end	End of maze drawing routine
.jump	Choose a random square. If it has been visited then go to **jump**, if not then return to **choose**

When the maze has been designed, and random start, treasure and exit positions have been chosen, then it's all up to you.

If you own an Archimedes or A3000, you should try running this program – it's quite fast – and you may like to try improving on it. Dave says he has developed a 3D maze that is constructed within a cube where it is possible to go up and down. We might publish that one day.

FRACTAL FORMULAE

How else can you get lost? Well, how about entering the fascinating world of fractals? These were first explored in *BAU* October 1983, in which **Susan Stepney** outlined the formulae to create some weird and wonderful shapes.

First studied by Benoît Mandelbrot, who was producing some very real landscapes, the fractal holds infinite detail and, although a computer has limited resolution, the effect of zooming in on such a curve can produce surprising results.

Susan gives this equation as an example:

$z_n+1=Az_n(1-z_n)$

This produces the effect in listing 1. Consider the simplest case when z and A are both real. The question is, given a value of A and an initial 'seed' (z0), does z_n settle down to a steady value as n gets large, does it diverge or does it do something else? The answer does not depend on the seed, if it lies between 0 and 1. It is, however, very sensitive to the choice of A. (Assume a is greater than 0. You may also like to try it with negative values).

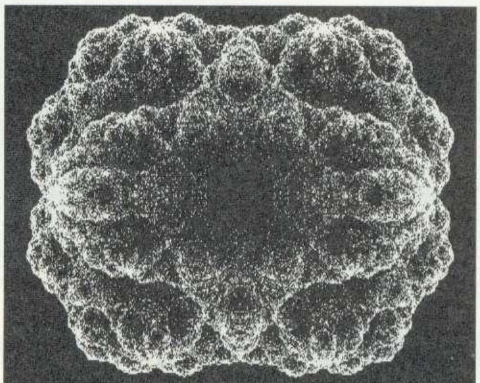
Run program 1 and for Ainit enter 1. This produces a plot of A along the horizontal axis, (from Ainit to 4) and the corresponding value of z up the vertical axis. For A less than 3, z settles down to a value of 1- (1/A) after a few steps. Then the surprises start. As A increases above three the curves of z against A split into two – there are now two values which z hops between. As A increases, the curve splits again, and these splits happen at a greater rate until A becomes approximately 3.57. Then z becomes chaotic and hops between 0 and 1 in infinite steps.

Through this chaos comes order and z begins to settle down again as three islands of blank space are created. Listing 2 is the same as listing 1, except that sound is used instead of pixels.

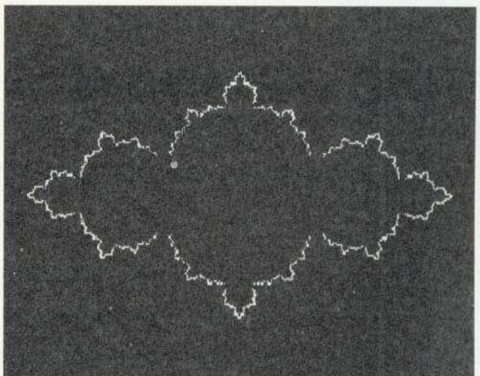
Listing 3 produces a curtain-like shape by inversing the equation used in listing 1.

Listings 4 and 5 use complex numbers. A complex number can be represented by a coordinate, being made up of the X value along a standard number scale (-infinity to infinity) and the Y value. Complex numbers can be added, subtracted and multiplied using vectors.

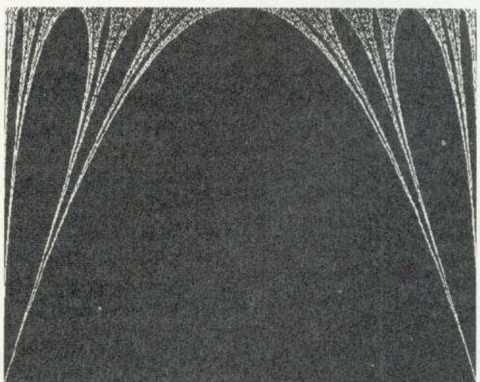
Note that there are two random number generators to choose the sign of the square root, ie, the root chosen can be different for the real and imaginary parts of z_n. The second equation shows there are two roots, so two random numbers are required. The pictures are no less interesting just because they are not the solution. They illustrate self similarity, where each frond is a smaller replicate of the one before.



A PUFF BALL CAN BE CREATED



USING COMPLEX NUMBERS



IT'S CURTAINS FOR THIS FRACTAL

SOUNDING OUT

Finally, how about some sounds? Joe Telford had his Beeb mimicking sirens and telephones in BAU September 1986 with this short program (listing 6). Perhaps you can do better? Send in your best sounds with your name and address written into the program and I'll include a few on the BAU monthly disc.

TELLY ADDICTS

ALAN CLAMP wipes the dust off his old teletext adaptor and tunes in to some real educational value

The decision 18 months ago to close down the broadcasting of telesoftware was a big blow to education. The BBC claimed that there were only 31,500 teletext adaptor owners. However, most of the adaptors in education were used in secondary schools, colleges and universities and the recipients of the programs were not one per adaptor but hundreds or, in some cases, thousands.

However, it was not the simple downloading of programs that was useful in education – such material can be obtained in other ways and the value of free software is always doubtful. The importance of telesoftware was in the interactive nature of programs that allowed the capture of teletext information.

Programs transmitted in the past to capture and use information about recipes, sports results and foreign currency, all have obvious educational value. I have used teletext pages to show match reports on football games which pupils have seen and this has encouraged them to write their own sports reports.

The use of programs to obtain the changing stock market prices are vital for teaching students this aspect of business studies although the information is also cross-curricular.

The recent introduction of satellite weather pictures gave a new dimension to IT work in many schools. The ability to capture weather pictures, store them on disc and print them out to show the development of weather patterns is impressive.

They certainly cause a buzz when they are shown to students. The chance to capture up-to-date information from teletext and work with it has an immediacy that is a vital ingredient in motivating pupils. The bland white on black information shown on most on-line databases is a real turn-off for most pupils, especially when compared with the colourful presentation seen on teletext screens.

As cited in the attainment targets for design and technology in the National Curriculum, teletext gives the chance to contribute to the 'exploration and investigation of a range of contexts', whether it's home, school, recreation, community, business or industry.

However, to do this, you now have to do-it-yourself. Many schools probably have Acorn teletext adaptors sitting in cupboards. Those who can use their adaptors with TV aerial sockets can still avail themselves of *Ceefax* and *Oracle* information. This is a simple program to be used with the Printmaster Rom:

```
1ø MODE 7
2ø *TTXON REM switches adaptor on
3ø *BBC1 REM selects channel
4ø *PAGE 581 REM grabs page
5ø *TRANSFER 7øøø REM transfers to memory address
6ø *DISPLAY 7øøø REM displays page
7ø *GDUMP REM dumps screen to printer
8ø *TTXOFF REM turns adaptor off
```

This simple program can be adapted very easily to give a printout of any *Oracle* or *Ceefax* information.

It is one of the great advantages of the BBC micro and the other computers in this range that the input/output ports can be readily used to connect peripherals.

For those who wish to use teletext but don't already have an adaptor gathering dust, the Morley Teletext Adaptor is still available and Beebug lists one in its sales literature. However, especially for impoverished schools, there are many secondhand bargains around.

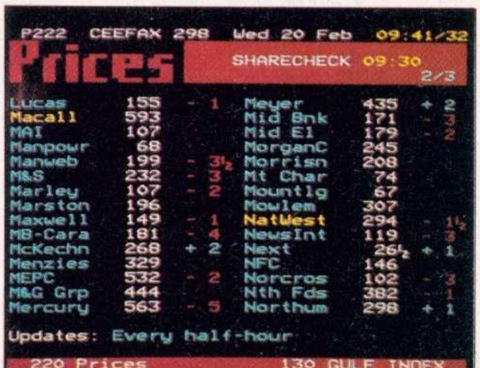


GOING PLACES

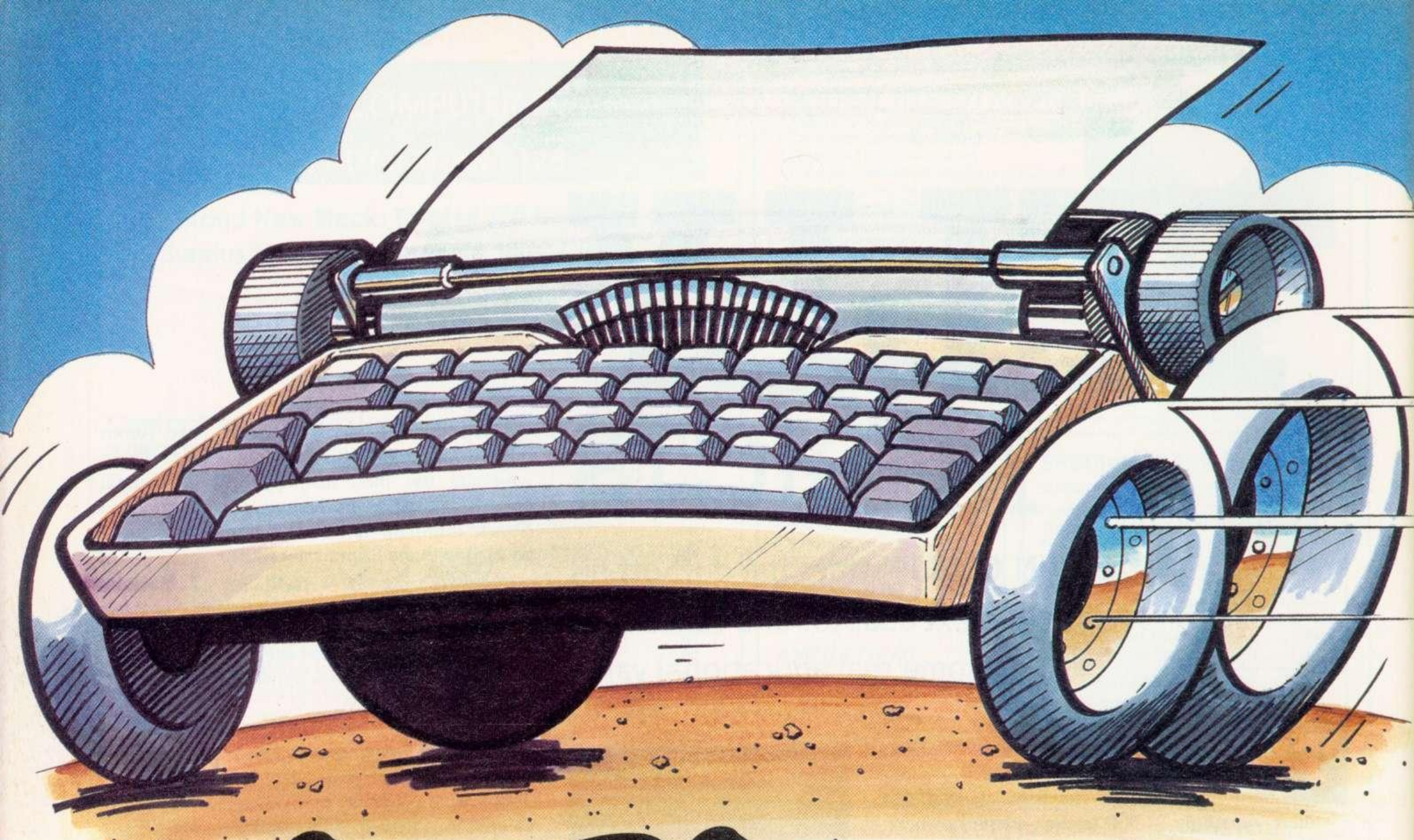
DATA ABOUT FOOD, SPORT OR CURRENCY HAS GREAT EDUCATIONAL POTENTIAL



CHECKING OUT THE WEATHER



MONEY MAKES THE WORLD GO AROUND



YELLOW PAGES

Program	Page	BBC B	B+/128	Master	Master Compact	Electron	Arc	6502SP Turbo	ADFS	Econet	Shadow Ram	Monthly Disc
Risc Revue	30						■		■	■		■
Eightbits	58											
Listing 1		■	■	■	■	■		■	■	■	■	■
Listing 2		■	■	■	■	■		■	■	■	■	■
Listing 3		■	■	■	■	■		■	■	■	■	■
Listing 4				■	■				■	■	■	■
Listing 5				■	■				■	■	■	■
Jigword	62											
Listing 1							■		■	■		■
Listing 2		■	■	■	■	■	■	■	■	■	■	■
Hats (1)	74											
Listing 1		■	■	■	■				■		■	■
Listing 2							■		■	■	■	■
Pieces of 8	76											
Listing 1		■	■	■	■	■	■	■	■	■	■	■
Listing 2-6		■	■	■	■	■	■	■	■	■	■	■
Listing 7		■	■	■	■			■	■	■	■	■
Exile Editor	120											
Listings 1-2		■	■	■	■	■		■	■	■	■	■

Note (1) BBC Model B owners need to set PAGE to &1300 before running the Hattrix designer.

Risc Revue

Listing 1

```
  1Ø REM >Atoms (RR1)
  2Ø REM Nuclear Reaction strategy game
  3Ø REM by Adrian St John
  4Ø REM for Archimedes only
  5Ø REM (c) BAU April 1991
  6Ø :
  7Ø REPEAT
  8Ø INPUT "How many players? (2-6) "pl
ayers%
  9Ø UNTIL players%>=2 AND players%<=6
 1ØØ size%=12*1Ø
 11Ø ON ERROR PROCerror
 12Ø PROCinit
 13Ø PROCgame
 14Ø PROCoutput("Player "+STR$(winner%)
+" has won.",winner%)
 15Ø VDU 4
 16Ø PRINTTAB(Ø,2Ø);
 17Ø END
 18Ø :
 19Ø DEF PROCinit
 2ØØ LOCAL i,j
 21Ø MODE 9
 22Ø OFF
 23Ø COLOUR 15,128,128,128
 24Ø COLOUR 14,255,255,255
 25Ø VDU 23,17,7,6,8;16;Ø;Ø;
 26Ø VDU 5
 27Ø GCOL 15
 28Ø RECTANGLE FILL Ø,928,1279,1Ø23
 29Ø max_x%=(128Ø/size%)-1
 3ØØ max_y%=(9ØØ/size%)-1
 31Ø DIM player(max_x%,max_y%)
 32Ø DIM amount(max_x%,max_y%)
 33Ø DIM count(players%)
 34Ø FOR i=Ø TO max_x%
 35Ø FOR j=Ø TO max_y%
 36Ø PROCdraw(i,j)
 37Ø NEXT j
 38Ø NEXT i
 39Ø MOUSE ON
 4ØØ MOUSE RECTANGLE Ø,Ø,(max_x%+1)*siz
e%-1,(max_y%+1)*size%-1
 41Ø still_playing=players%
 42Ø count(Ø)=-1
 43Ø ENDPROC
 44Ø :
 45Ø DEF PROCgame
 46Ø LOCAL pl,end_of_game
 47Ø FOR pl=1 TO players%
 48Ø PROCplay(pl)
 49Ø NEXT pl
 5ØØ REPEAT
 51Ø end_of_game=FALSE
 52Ø FOR pl=1 TO players%
 53Ø IF count(pl)>Ø THEN
 54Ø PROCplay(pl)
 55Ø IF still_playing=1 THEN
 56Ø winner%=pl
 57Ø pl=players%
 58Ø end_of_game=TRUE
 59Ø ENDIF
 6ØØ ENDIF
 61Ø NEXT pl
 62Ø UNTIL end_of_game
 63Ø ENDPROC
 64Ø :
 65Ø DEF PROCplay(p)
 66Ø LOCAL x%,y%,k%
 67Ø PROCoutput("Player "+STR$(p),p)
 68Ø REPEAT
 69Ø REPEAT
 7ØØ MOUSE x%,y%,k%
 71Ø UNTIL k%=4
 72Ø REPEAT
 73Ø MOUSE x%,y%,k%
 74Ø UNTIL k%=Ø
 75Ø x%=x%/size%
 76Ø y%=y%/size%
 77Ø IF player(x%,y%)<>p AND amount(x%,
y%)<>Ø VDU 7
 78Ø UNTIL amount(x%,y%)=Ø OR player(x%
,y%)=p
 79Ø PROCreact(x%,y%,p)
 8ØØ ENDPROC
 81Ø :
 82Ø DEF PROCreact(x,y,c)
 83Ø LOCAL reactor,old_pl
 84Ø IF still_playing>1 THEN
 85Ø old_pl=player(x,y)
 86Ø count(old_pl)-=amount(x,y)
 87Ø amount(x,y)+=1
 88Ø count(c)+=amount(x,y)
 89Ø player(x,y)=c
 9ØØ IF count(old_pl)=Ø THEN
 91Ø count(old_pl)=-1
 92Ø still_playing-=1
 93Ø ENDIF
 94Ø reactor=4+(x=Ø)+(x=max_x%)+(y=Ø)+(
y=max_y%)
 95Ø IF amount(x,y)>=reactor THEN
 96Ø amount(x,y)-=reactor
 97Ø count(c)-=reactor
 98Ø PROCdraw(x,y)
 99Ø IF x>Ø       PROCreact(x-1,y,c)
1ØØØ IF x<max_x% PROCreact(x+1,y,c)
1Ø1Ø IF y>Ø       PROCreact(x,y-1,c)
1Ø2Ø IF y<max_y% PROCreact(x,y+1,c)
1Ø3Ø ENDIF
1Ø4Ø PROCdraw(x,y)
1Ø5Ø ENDIF
1Ø6Ø ENDPROC
1Ø7Ø :
1Ø8Ø DEF PROCdraw(x,y)
1Ø9Ø LOCAL c,n
11ØØ c=player(x,y)
111Ø n=amount(x,y)
112Ø x=x*size%
113Ø y=y*size%
114Ø GCOL 15
115Ø RECTANGLE x,y,size%,size%
116Ø CASE n OF
117Ø WHEN Ø:
118Ø PROCbox(x,y,Ø)
119Ø WHEN 1:
12ØØ PROCbox(x,y,c)
121Ø PROCcircle(x,y,.5,.5)
122Ø WHEN 2:
123Ø PROCbox(x,y,c)
124Ø PROCcircle(x,y,1/3,1/3)
125Ø PROCcircle(x,y,2/3,2/3)
126Ø WHEN 3:
127Ø PROCbox(x,y,c)
128Ø PROCcircle(x,y,1/2,3/4)
129Ø PROCcircle(x,y,1/4,1/4)
13ØØ PROCcircle(x,y,3/4,1/4)
131Ø WHEN 4:
132Ø PROCbox(x,y,c)
133Ø PROCcircle(x,y,1/4,1/4)
134Ø PROCcircle(x,y,3/4,3/4)
135Ø PROCcircle(x,y,1/4,3/4)
136Ø PROCcircle(x,y,3/4,1/4)
137Ø OTHERWISE:
138Ø PROCbox(x,y,15)
139Ø ENDCASE
14ØØ ENDPROC
141Ø :
142Ø DEF PROCbox(x,y,c)
143Ø GCOL c
144Ø RECTANGLE FILL x+4,y+4,size%-8,siz
e%-8
145Ø ENDPROC
146Ø :
147Ø DEF PROCcircle(x,y,dx,dy)
148Ø GCOL 3,7
149Ø CIRCLE FILL x+dx*size%,y+dy*size%,
size%/1Ø
15ØØ ENDPROC
151Ø :
152Ø DEF PROCoutput(a$,c%)
153Ø GCOL 15
154Ø RECTANGLE FILL Ø,1Ø24-96,128Ø,1Ø24
155Ø GCOL c%
156Ø MOVE (4Ø-LEN(a$))*8*2,1Ø23-16
157Ø PRINT a$
158Ø ENDPROC
159Ø :
16ØØ DEF PROCerror
161Ø VDU 4
162Ø IF ERR<>17 REPORT:PRINT" at line "
;ERL
163Ø END
164Ø ENDPROC
```

Listing 2

```
  1Ø REM >Waves (RR2)
  2Ø REM by Barry Wickett
  3Ø REM for Archimedes only
  4Ø REM (c) BAU April 1991
  5Ø :
  6Ø MODE 13
  7Ø OFF
  8Ø filename$="PaintDemo"
  9Ø spritename$="riscos"
```

Continued ▶

◀ Continued

```
  100 SYS "OS_File",5,filename$ TO ,,,,e
xt%
  110 DIM sprite% ext%+16
  120 !sprite%=ext%+16
  130 sprite%!4=Ø
  140 sprite%!8=16
  150 sprite%!12=16
  160 SYS "OS_SpriteOp",1Ø+256,sprite%,f
ilename$
  170 SYS "OS_SpriteOp",4Ø+256,sprite%,s
pritename$ TO ,,,xl%,yl%
  180 SYS "OS_SpriteOp",6Ø+256,sprite%,s
pritename$ TO rØ,r1,r2,r3
  190 GCOL Ø,Ø TINT Ø
  200 RECTANGLE Ø,Ø,xl%*4-4,yl%*4-4
  210 RECTANGLE 4,4,xl%*4-12,yl%*4-12
  220 SYS "OS_SpriteOp",rØ,r1,r2,r3
  230 SYS "OS_SpriteOp",24+256,sprite%,s
pritename$ TO ,,s%
  240 data%=s%+s%!32
  250 PROCmc
  260 CLS
  270 REPEAT
  280 CALL code%
  290 UNTIL NOT INKEY(Ø)
  300 END
  310 :
  320 DEF PROCmc
  330 DIM code% 15ØØ
  340 speed=3*4
  350 xm=Ø
  360 ym=1
  370 x=2
  380 y=3
  390 height=4
  400 col=5
  410 sprite=6
  420 screen=7
  430 count=8
  440 wave=9
  450 pixel=1Ø
  460 pos=11
  470 ry=12
  480 FOR pass=Ø TO 2 STEP 2
  490 P%=code%
  500 [OPT pass
  510 ADR RØ,vdu
  520 ADR R1,start
  530 SWI "OS_ReadVduVariables"
  540 ADR wave,table
  550 LDR sprite,data
  560 LDR screen,start
  570 LDR pos,indent
  580 LDR count,shift
  590 ADD count,count,#speed
  600 AND count,count,#1Ø2Ø
  610 STR count,shift
  620 ADD screen,screen,pos
  630 LDR xm,xmax
  640 LDR ym,ymax
  650 MOV pixel,#Ø
  660 MOV x,#Ø
  670 :
  680 .nextx
  690 MOV y,#Ø
  700 ADD height,count,x,LSL#2
  710 AND height,height,#1Ø2Ø
  720 LDR height,[wave,height]
  730 :
  740 .nexty
  750 LDRB col,[pixel,sprite]
  760 ADD pixel,pixel,xm
  770 ADD ry,height,y
  780 SUB ry,ry,x
  790 MOV ry,ry,ASR#1
  800 ADD pos,x,ry,LSL#6
  810 ADD pos,pos,ry,LSL#8
  820 ADD pos,pos,y
  830 STRB col,[pos,screen]
  840 ADD pos,pos,#32Ø
  850 STRB col,[pos,screen]
  860 ADD y,y,#1
  870 CMP y,ym
  880 BLT nexty
  890 ADD x,x,#1
  900 MOV pixel,x
  910 CMP x,xm
  920 BLT nextx
  930 MOV PC,R14
  940 :
  950 .xmax
  960 EQUD xl%
  970 :
  980 .ymax
  990 EQUD yl%
 1000 :
 1010 .data
 1020 EQUD data%
 1030 :
 1040 .shift
 1050 EQUD Ø
 1060 :
 1070 .vdu
 1080 EQUD 149
 1090 EQUD -1
 1100 :
 1110 .indent
 1120 EQUD (256-yl%)*32Ø
 1130 :
 1140 .start
 1150 EQUD Ø
 1160 EQUD Ø
 1170 .table
 1180 ]
 1190 NEXT pass
 1200 FOR x%=Ø TO 255
 1210 ang=PI*8/256*x%
 1220 !P%=EXP(SIN(ang))*1Ø
 1230 P%+=4
 1240 NEXT x%
 1250 ENDPROC
```

Listing 3

```
   10 REM >CMOS (RR3)
   20 REM by Rich Boakes
   30 REM for Archimedes only
   40 REM (c) BAU April 1991
   50 :
   60 PRINT"Currently: ";
   70 FOR R%=3Ø TO 45
   80 SYS "OS_Byte",161,R% TO ,,C%
   90 IF C%<32 OR C%=127 THEN C%=46
  100 VDU C%
  110 NEXT
  120 PRINT
  130 INPUT"Change to: "N$
  140 FOR R%=3Ø TO 45
  150 C%=ASC(MID$(N$,R%-29,1))
  160 IF C%=-1 THEN C%=46
  170 SYS "OS_Byte",162,R%,C%
  180 NEXT
  190 END
```

Listing 4

```
   10 REM >ScrVarS (RR4)
   20 REM by David Lawrence
   30 REM for Archimedes only
   40 REM (c) BAU April 1991
   50 :
   60 DIM code &1ØØØ
   70 sp=13
   80 link=14
   90 pc=15
  100 FOR pass=Ø TO 2 STEP 2
  110 P%=code
  120 [OPT pass
  130 .start
  140 ADR RØ,varname
  150 ADR R1,varcode
  160 MOV R2,#end-varcode
  170 MOV R3,#Ø
  180 MOV R4,#16
  190 SWI "OS_SetVarVal"
  200 MOV pc,link
  210 :
  220 .varname
  230 EQUS "Screen$Start"
  240 EQUB Ø
  250 ALIGN
  260 :
  270 .varcode
  280 B varwrite
  290 STMFD (sp)!,{link}
  300 MOV RØ,#148
  310 STR RØ,screen
  320 MVN RØ,#Ø
  330 STR RØ,screen+4
  340 ADR RØ,screen
  350 ADR R1,screen
  360 SWI "OS_ReadVduVariables"
  370 LDR RØ,screen
  380 ADR R1,buffer
  390 MOV R2,#9
  400 SWI "XOS_ConvertHex8"
  410 MOV R2,#8
  420 LDMFD (sp)!,{pc}
  430 .varwrite
  440 MOV pc,link
  450 :
  460 .screen
  470 EQUD Ø:EQUD Ø
  480 :
  490 .buffer
  500 EQUS "1234567 8Ø"
  510 ALIGN
  520 .end
  530 :
  540 ]
  550 NEXT pass
  560 SYS "OS_File",1Ø,"ScrVar",&FFC,,st
art,end
  570 END
```

Listing 5

```
   10 REM >Mask (RR5)
   20 REM by Dave Acton
   30 REM for Archimedes only
   40 REM (c) BAU April 1991
   50 :
   60 MODE 12
   70 OFF
   80 COLOUR 8,&6Ø,&6Ø,&6Ø
   90 sq%=32
  100 PROCgrid(Ø,8)
  110 PROCmask
  120 END
  130 :
  140 DEF PROCmask
  150 size%=&2ØØØ
  160 DIM area% size%
  170 chunk%=12
  180 !area%=size%
  190 area%!4=Ø
  200 area%!8=16
  210 area%!12=16
  220 SYS "OS_SpriteOp",15+256,area%,"li
ne",Ø,64Ø,chunk%,12
  230 SYS "OS_SpriteOp",24+256,area%,"li
ne" TO ,,sa%
  240 SYS "OS_SpriteOp",29+512,area%,sa%
  250 SYS "OS_SpriteOp",62+256,area%,"li
ne" TO ,,,psize%
  260 DIM pres% psize%
  270 !pres%=Ø
  280 FOR l%=1Ø24 TO -4*chunk% STEP -4*c
hunk%
  290 !pres%=Ø
  300 SYS "OS_SpriteOp",6Ø+512,area%,sa%
,pres% TO rØ%,r1%,r2%,r3%
  310 ORIGIN Ø,-l%
  320 PROCgrid(6,7)
  330 SYS "OS_SpriteOp",61+512,area%,sa%
  340 ORIGIN Ø,-l%
  350 GCOL 128+15
  360 CLG
  370 GCOL Ø
  380 CIRCLE FILL 64Ø,512,46Ø
  390 GCOL 15
  400 VDU 5
  410 VDU 23,17,7,6,16;16|
  420 PROCm("This is a demonstration",51
2+32+96)
  430 PROCm("of how to write to",512+32)
  440 PROCm("a sprite mask.",512+32-96)
  450 SYS "OS_SpriteOp",rØ%,r1%,r2%,r3%
  460 SYS "OS_SpriteOp",34+512,area%,sa%
,Ø,l%,8
  470 NEXT
  480 END
  490 :
  500 DEF PROCm(m$,y%)
  510 MOVE 64Ø-16*LEN(m$),y%
  520 PRINT m$;
  530 ENDPROC
  540 :
  550 DEF PROCgrid(col1%,col2%)
  560 LOCAL i%
  570 GCOL col2%
  580 GCOL 128+col1%
  590 CLG
  600 FOR i%=Ø TO 128Ø STEP sq%
  610 RECTANGLE FILL i%-2,Ø,4,1Ø24
  620 NEXT
  630 FOR i%=Ø TO 1Ø24 STEP sq%
  640 RECTANGLE FILL Ø,i%-2,128Ø,4
  650 NEXT
  660 ENDPROC
```

Eight Bits

Listing 1

```
   10 REM Colour Dump (EB1)
   20 REM by J.R.Barker
   30 REM for B/B+/E/M/C
   40 REM (c) BAU Apr 1991
   50 :
   60 MODE 7
   70 INPUT''"ENTER NAME OF PICTURE FILE
 TO BE PRINTED :" F$
   80 DIM INKCOL(3)
   90 PRINT''"CHOOSE THE INK COLOURS FOR
 THE FOUR MODE 1 LOGIC COLOURS, Ø 1 2 3,
 IN ORDER."
  100 PRINT''"INK COLOURS are entered by
 number -"''"Ø  black         4  yellow"'
"1  magenta       5  orange"'"2  cyan
    6  green"'"3  violet          7  (whit
e)"
  110 INPUT''"TYPE THE FOUR COLOUR NUMBE
RS REQUIRED,  each followed by a <RETURN
> -"',INKCOL(Ø),INKCOL(1),INKCOL(2),INKC
OL(3)
  120 PRINT''"Type <SPACE> if satisfied
or <R> if not."
  130 IF GET<>32 THEN 11Ø ELSE CLS
  140 PRINTTAB(Ø,1Ø)"CHECK PRINTER IS ON
-LINE"''"Press <SPACE> to continue."
  150 REPEAT UNTIL GET=32
  160 CLS
  170 PRINTTAB(Ø,1Ø)"GIVE LEFT MARGIN SE
TTING for printer in units of Ø.1 inch"'
"and press <RETURN>"
  180 INPUTTAB(Ø,13) mar%
  190 linefeed=1Ø
  200 :
  210 hi_s=&7Ø
  220 lo_s=&78
  230 pixcols=&8Ø
  240 pos=&89
  250 byte=&8B
  260 dot=&8C
  270 times=&8D
  280 block=&8E
  290 searchcol=&8F
  300 osword=&FFF1
  310 oswrch=&FFEE
  320 dump=&9ØØ
  330 PROCass
  340 :
  350 MODE 1
  360 OSCLI("LOAD "+F$)
  370 VDU 23,1,Ø;Ø;Ø;Ø;
  380 D%=64Ø
  390 N1%=D% MOD 256
  400 N2%=D% DIV 256
  410 VDU2,1,27,1,8Ø,1,27,1,1Ø8,1,mar%
  420 VDU1,27,1,65,1,8
  430 :
  440 FOR band=Ø TO 31
  450 MAI%=&3ØØØ+band*&28Ø
  460 VDU1,linefeed
  470 FOR SWEEP=Ø TO 3
  480 ?searchcol=SWEEP
  490 IF INKCOL(SWEEP)=7 THEN 55Ø
  500 VDU 1,27,1,114,1,INKCOL(SWEEP)
  510 VDU 1,27,1,42,1,1,1,N1%,1,N2%
  520 ?pos=MAI% MOD 256
  530 pos?1=MAI% DIV 256
  540 CALL dump
  550 VDU 1,13
  560 NEXT
  570 NEXT
  580 :
  590 VDU 1,27,1,64,1,linefeed,3
  600 VDU 23,1,1;Ø;Ø;Ø;
  610 END
  620 :
  630 DEF PROCass
  640 FOR pass=Ø TO 3 STEP 3
  650 P%=dump
  660 [OPT pass
  670 .initdump
  680 LDA #8Ø
  690 STA block
  700 .nextblock
  710 LDY #Ø
  720 .transfer
  730 LDA (pos),Y
```

Continued ▶

◀ **Continued**

```
 740 STA hi_s,Y
 750 ASL A
 760 ASL A
 770 ASL A
 780 ASL A
 790 STA lo_s,Y
 800 INY
 810 CPY #8
 820 BNE transfer
 830 :
 840 LDA #4
 850 STA times
 860 .next
 870 LDX #7
 880 .getpixels
 890 LDA #Ø
 900 ASL hi_s,X
 910 ROL A
 920 ASL lo_s,X
 930 ROL A
 940 AND #3
 950 STA pixcols,X
 960 DEX
 970 BPL getpixels
 980 LDX #Ø
 990 LDA #Ø
1000 STA byte
1010 .getdots
1020 LDA searchcol
1030 CMP pixcols,X
1040 BEQ one
1050 LDA #Ø
1060 STA dot
1070 JMP o
1080 .one
1090 LDA #1
1100 STA dot
1110 .o
1120 LDA byte
1130 ASL A
1140 CLC
1150 ADC dot
1160 STA byte
1170 INX
1180 CPX #8
1190 BNE getdots
1200 LDA #1
1210 JSR oswrch
1220 LDA byte
1230 JSR oswrch
1240 LDA #1
1250 JSR oswrch
1260 LDA byte
1270 JSR oswrch
1280 DEC times
1290 BNE next
1300 LDA pos
1310 CLC
1320 ADC #8
1330 STA pos
1340 BNE not_hi
1350 INC pos+1
1360 .not_hi
1370 DEC block
1380 BNE nextblock
1390 RTS
1400 ]
1410 NEXT
1420 ENDPROC
1430 END
```

Listing 2

```
  10 REM Output a Binary number (EB2)
  20 REM by Andrew Pepperell
  30 REM for B/B+/M/C/E
  40 REM (c) BAU Apr 1991
  50 :
  60 PROCassemble
  70 PROCchecksum
  80 PROCsavecode
  90 END
 100 :
 110 DEF PROCchecksum
 120 I%=Ø
 130 FOR M%=start TO P%-1
 140 I%=I%+?M%
 150 NEXT
 160 IF I%=48568 ENDPROC
 170 VDU 7
 180 PRINT "Error in Code."
 190 END
 200 :
 210 DEF PROCsavecode
 220 name$="Output"
 230 OSCLI("SAVE "+name$+" "+STR$~start
+" "+STR$~P%)
 240 ENDPROC
 250 :
 260 DEF PROCassemble
 270 powerbuf=&19ØØ
 280 number=&4ØØØ
 290 osfind=&FFCE
 300 osbget=&FFD7
 310 osargs=&FFDA
 320 osnewl=&FFE7
 330 oswrch=&FFEE
 340 pointer=&A8
 350 channel=&AA
 360 powy=&AB
 370 numy=&AC
 380 powaddr=&AD
 390 numaddr=&7Ø
 400 digits=&72
 410 highbyte=&74
 420 zeroflag=&75
 430 start=&9ØØ
 440 :
 450 FOR pass=Ø TO 3 STEP 3
 460 P%=start
 470 [
 480 OPT pass
 490 LDA #1
 500 LDX #pointer
 510 LDY #Ø
 520 JSR osargs
 530 LDY #Ø
 540 LDA (pointer),Y
 550 CMP #13
 560 BNE syntaxok
 570 :
 580 .badsyntax
 590 BRK
 600 EQUB (16)
 610 EQUS ("Output <digits> <fname>")
 620 BRK
 630 :
 640 .syntaxok
 650 STY digits
 660 STY digits+1
 670 :
 680 .readdig
 690 LDA (pointer),Y
 700 DEY
 710 JSR whichdigit
 720 CMP #16
 730 BEQ losespaces
 740 LDX #4
 750 :
 760 .double
 770 ASL digits
 780 ROL digits+1
 790 DEX
 800 BNE double
 810 ORA digits
 820 STA digits
 830 INY
 840 INY
 850 JMP readdig
 860 :
 870 .losespaces
 880 INY
 890 LDA (pointer),Y
 900 CMP #32
 910 BEQ losespaces
 920 TYA
 930 CLC
 940 ADC pointer
 950 TAX
 960 LDA pointer+1
 970 ADC #Ø
 980 TAY
 990 LDA #&4Ø
1000 JSR osfind
1010 CMP #Ø
1020 BEQ badsyntax
1030 STA channel
1040 LDA digits
1050 CLC
1060 ADC #1
1070 STA digits
1080 LDA digits+1
1090 ADC #Ø
1100 STA digits+1
1110 LSR digits+1
1120 ROR digits
1130 LDA digits+1
1140 CMP #&2Ø
1150 BCS badsyntax
1160 JSR initptrs
1170 JSR clearbufs
1180 LDA #1
1190 STA powerbuf
1200 :
1210 .mainloop
1220 LDY channel
1230 JSR osbget
1240 BCC notclose
1250 LDA #Ø
1260 JSR osfind
1270 JMP printnumber
1280 :
1290 .notclose
1300 CMP #Ø
1310 BEQ notadd
1320 JSR addpower
1330 :
1340 .notadd
1350 JSR nextpower
1360 JMP mainloop
1370 :
1380 .nextpower
1390 LDA #powaddr
1400 STA mnemonics+1
1410 STA mnemonics+5
1420 JMP operation
1430 :
1440 .addpower
1450 LDA #numaddr
1460 STA mnemonics+1
1470 STA mnemonics+5
1480 :
1490 .operation
1500 JSR initptrs
1510 LDY #Ø
1520 STY highbyte
1530 SED
1540 CLC
1550 PHP
1560 :
1570 .addloop
1580 PLP
1590 :
1600 .mnemonics
1610 LDA (numaddr),Y
1620 ADC (powaddr),Y
1630 STA (numaddr),Y
1640 PHP
1650 INY
1660 BNE notzero
1670 INC highbyte
1680 INC powaddr+1
1690 INC numaddr+1
1700 :
1710 .notzero
1720 CPY digits
1730 BNE addloop
1740 LDA highbyte
1750 CMP digits+1
1760 BNE addloop
1770 PLP
1780 CLD
1790 RTS
1800 :
1810 .hexdigs
1820 EQUS ("Ø123456789ABCDEF ")
1830 :
1840 .whichdigit
1850 LDX #Ø
1860 :
1870 .whichloop
1880 CMP hexdigs,X
1890 BEQ founddig
1900 INX
1910 CPX #17
1920 BNE whichloop
1930 JMP badsyntax
1940 :
1950 .founddig
1960 TXA
1970 RTS
1980 :
1990 .initptrs
2000 LDA #powerbuf MOD 256
2010 STA powaddr
2020 LDA #powerbuf DIV 256
2030 STA powaddr+1
2040 LDA #number MOD 256
2050 STA numaddr
2060 LDA #number DIV 256
2070 STA numaddr+1
2080 :
2090 .doneclear
2100 RTS
2110 :
2120 .clearbufs
2130 LDY #Ø
2140 STY highbyte
2150 TYA
2160 :
2170 .clearloop
2180 STA (powaddr),Y
2190 STA (numaddr),Y
2200 INY
2210 BNE clearcheck
2220 INC highbyte
2230 INC powaddr+1
2240 INC numaddr+1
2250 :
2260 .clearcheck
2270 CPY digits
2280 BNE clearloop
2290 LDA highbyte
2300 CMP digits+1
2310 BEQ doneclear
2320 LDA #Ø
2330 JMP clearloop
2340 :
2350 .printnumber
2360 LDA #Ø
2370 STA zeroflag
2380 JSR initptrs
2390 LDA numaddr+1
2400 CLC
2410 ADC digits+1
2420 STA numaddr+1
2430 LDA digits+1
2440 STA highbyte
2450 LDY digits
2460 DEY
2470 CPY #255
2480 BNE printloop
2490 DEC numaddr+1
2500 DEC highbyte
2510 :
2520 .printloop
2530 LDA (numaddr),Y
2540 BNE normal
2550 LDA zeroflag
2560 BEQ nextprint
2570 :
2580 .normal
2590 LDA zeroflag
2600 BNE firsthalf
2610 LDA (numaddr),Y
2620 CMP #1Ø
2630 BCC secondhalf
2640 :
2650 .firsthalf
2660 LDA (numaddr),Y
2670 LSR A
2680 LSR A
2690 LSR A
2700 LSR A
2710 TAX
2720 LDA hexdigs,X
2730 JSR oswrch
2740 :
2750 .secondhalf
2760 LDA (numaddr),Y
2770 AND #15
2780 TAX
2790 LDA hexdigs,X
2800 JSR oswrch
2810 LDA #1
2820 STA zeroflag
2830 :
2840 .nextprint
2850 DEY
2860 CPY #255
2870 BNE prcheck
2880 DEC highbyte
2890 DEC numaddr+1
2900 :
2910 .prcheck
2920 CPY #255
2930 BNE printloop
2940 LDA highbyte
2950 CMP #255
2960 BNE printloop
2970 JSR osnewl
2980 RTS
2990 ]
3000 NEXT
3010 ENDPROC
```

Listing 3

```
  10 REM Perfect (EB3)
  20 REM by Andrew Pepperell
  30 REM for B/B+/M/C/E/A
  40 REM (c) BAU April 1991
  50 :
  60 INPUT "n:"n
  70 INPUT "Filename:"fname$
  80 C%=OPENOUT(fname$)
  90 FOR L%=1 TO n-1
 100 BPUT #C%,Ø
 110 NEXT
 120 FOR L%=1 TO n
 130 BPUT #C%,1
 140 NEXT
 150 CLOSE #C%
```

◀ Continued

Listing 4

```
10 REM KopyKat (EB4)
20 REM by D Holton
30 REM for M/C with SRAM
40 REM (c) BAU April 1991
50 :
60 Z%=&DDØØ
70 outCounterLo=&BC
80 outCounterHi=&BD
90 inCounterLo=&BE
100 inCounterHi=&BF
110 osasci=&FFE3
120 osnewl=&FFE7
130 :
140 FOR N%=4 TO 6 STEP 2
150 P%=&8ØØØ
160 O%=Z%
170 [ OPT N%
180 BRK
190 BRK
200 BRK
210 JMP whatsUpNow
220 EQUB &82
230 EQUB offset MOD &1ØØ
240 EQUB &91
250 .title
260 EQUS"KopyKat Ramdisc"
270 BRK
280 EQUB &ØD
290 EQUS"  KKSave"
300 EQUB &ØD
310 EQUS"  KKLoad"
320 EQUB &ØD
330 EQUB &1B
340 .offset
350 BRK
360 EQUS"(C) BAU April 1991"
370 BRK
380 :
390 .help
400 JSR osnewl
410 LDX #&FF
420 .helpLoop
430 INX
440 LDA title,X
450 JSR osasci
460 CMP #&1B
470 BNE helpLoop
480 JSR osnewl
490 .notOurHelp
500 BRA noClaim
510 :
520 .whatsUpNow
530 PHA
540 PHX
550 PHY
560 CMP #9
570 BEQ help
580 CMP #4
590 BEQ youRang
600 :
610 .noClaim
620 PLY
630 PLX
640 PLA
650 RTS
660 :
670 .youRang
680 LDA (&F2),Y
690 AND #&DF
700 CMP #ASC"K"
710 BNE notOurs
720 INY
730 LDA (&F2),Y
740 AND #&DF
750 CMP #ASC"K"
760 BNE notOurs
770 INY
780 LDA (&F2),Y
790 AND #&DF
800 CMP #ASC"S"
810 BEQ save
820 CMP #ASC"L"
830 BEQ load
840 :
850 .notOurs
860 BRA noClaim
870 :
880 .tooBig
890 LDA #ASC"!"
900 BRA claimOut
910 :
920 .save
930 LDA 1
940 SEC
950 SBC &18
960 STA pages
970 LDA #(&BFFF-store) DIV &1ØØ
980 SEC
990 SBC pages
1000 BMI tooBig
1010 BNE go
1020 LDA #(&BFFF-store) MOD &1ØØ
1030 SEC
1040 SBC Ø
1050 BMI tooBig
1060 :
1070 .go
1080 LDA 1
1090 STA topCopyHi
1100 LDA Ø
1110 STA topCopyLo
1120 LDA #store DIV &1ØØ
1130 STA inCounterHi
1140 STZ inCounterLo
1150 LDA &18
1160 STA outCounterHi
1170 STZ outCounterLo
1180 JSR shiftProg
1190 LDA inCounterHi
1200 LDA #ASC"*"
1210 :
1220 .claimOut
1230 JSR osasci
1240 JSR osnewl
1250 PLY
1260 PLX
1270 PLA
1280 LDA #Ø
1290 RTS
1300 :
1310 .load
1320 LDA topCopyHi
1330 STA 1
1340 STA 3
1350 LDA topCopyLo
1360 STA Ø
1370 STA 2
1380 LDA &18
1390 STA inCounterHi
1400 STZ inCounterLo
1410 LDA #store DIV &1ØØ
1420 STA outCounterHi
1430 STZ outCounterLo
1440 JSR shiftProg
1450 LDA #ASC"#"
1460 BRA claimOut
1470 :
1480 .shiftProg
1490 LDY #Ø
1500 LDX pages
1510 .sPloop
1520 LDA (outCounterLo),Y
1530 STA (inCounterLo),Y
1540 INY
1550 BNE sPloop
1560 INC inCounterHi
1570 INC outCounterHi
1580 DEX
1590 BPL sPloop
1600 RTS
1610 :
1620 .pages
1630 NOP
1640 .topCopyLo
1650 NOP
1660 .topCopyHi
1670 NOP
1680 .store
1690 ]
1700 NEXT
1710 OSCLI "SRWRITE "+STR$~Z%+" "+STR$~O%+" 8ØØØ 7"
1720 ?&2A8=&82
```

Listing 5

```
10 REM Reveal ROM &FCØØ to &FEFF (EB5)
20 REM by David Holton
30 REM for M/C
40 REM (c) BAU Apr 1991
50 :
60 MODE 135
70 accon=&FE34
80 P%=&DEØØ
90 [OPT Ø
100 LDA #&FC
110 STA &71
120 STZ &7Ø
130 LDX #3
140 LDY #Ø
150 .loop
160 LDA accon
170 PHA
180 ORA #&4Ø
190 STA accon
200 LDA (&7Ø),Y
210 STA &72
220 PLA
230 STA accon
240 LDA &72
250 JSR &FFEE
260 INY
270 BNE loop
280 INC &71
290 DEX
300 BNE loop
310 RTS
320 ]
330 CALL &DEØØ
```

Jigword

Listing 1

```
10 REM >JigWordA
20 REM By David Lawrence
30 REM For Archimedes only
40 REM (c) BAU April 1991
50 :
60 ON ERROR CLOSE #Ø:PRINTREPORT$;" at line ";ERL:END
70 MODE 4:OFF
80 CLOSE #Ø
90 :
100 ans_file=FNopenfile("Answers")
110 num_file=FNopenfile("Clues")
120 inf_file=FNopenfile("Info")
130 display=TRUE
140 :
150 PROCsetup
160 PROCreadwords
170 PROCreadgrid
180 PROCfindclues
190 IF display PROCshowgrid(Ø)
200 IF inf_file PROCclueloc(num_file)
210 PROCsolve(Grid$(),Words$(),Clues)
220 :
230 PROCclosefile(ans_file)
240 PROCclosefile(num_file)
250 PROCclosefile(inf_file)
260 END
270 :
280 DEF PROCsetup
290 DIM dir$(1)
300 dir$()=" Across"," Down"
310 Across=Ø
320 Down = 1
330 VDU23,255,&FFFF;&FFFF;&FFFF;&FFFF;
340 solutions=Ø
350 ENDPROC
360 :
370 DEF FNopenfile(file$)
380 IF file$="" THEN =Ø
390 =OPENOUT(file$)
400 :
410 DEF PROCclosefile(handle)
420 IF handle<>Ø THEN
430 CLOSE #handle
440 ENDIF
450 ENDPROC
460 :
470 DEF PROCreadwords
480 Words=Ø
490 maxlen=Ø
500 REPEAT
510 READ word$
520 IF LENword$>maxlen maxlen=LENword$
530 Words+=1
540 UNTIL word$="(end)"
550 Words-=1
560 RESTORE
570 DIM Words$(Words),x(Words),y(Words),len(Words),dir(Words),names$(Words)
580 DIM lengths(maxlen)
590 FOR word=1 TO Words
600 READ word$
610 Words$(word)=word$
620 lengths(LENword$)+=1
630 NEXT
640 READ end$
650 ENDPROC
660 :
670 DEF PROCreadgrid
680 READ xsize,ysize
690 DIM Grid$(xsize+1,ysize+1)
700 Grid$()="#"
710 FOR y=1 TO ysize
720 READ line$
730 FOR x = 1 TO xsize
740 Grid$(x,y)=MID$(line$,x,1)
750 NEXT
760 NEXT
770 ENDPROC
780 :
790 DEF PROCfindclues
800 Clues=Ø
810 number=1
820 FOR y=1 TO ysize
830 FOR x=1 TO xsize
840 IF Grid$(x,y)<>"#" THEN
850 start=FALSE
860 IF Grid$(x-1,y)="#" AND Grid$(x+1,y)<>"#" PROCfindlen(x,y,Across)
870 IF Grid$(x,y-1)="#" AND Grid$(x,y+1)<>"#" PROCfindlen(x,y,Down)
880 IF start number+=1
890 ENDIF
900 NEXT
910 NEXT
920 ENDPROC
930 :
940 DEF PROCfindlen(xf,yf,dir)
950 Clues+=1
960 x(Clues)=xf
970 y(Clues)=yf
980 dir(Clues)=dir
990 len=Ø
1000 REPEAT
1010 xf+=(1-dir)
1020 yf+=dir
1030 len+=1
1040 UNTIL Grid$(xf,yf)="#"
1050 len(Clues)=len
1060 names$(Clues)=STR$number+dir$(dir)
1070 start=TRUE
1080 ENDPROC
1090 :
1100 DEF PROCclueloc(file)
1110 clue=1
1120 FOR yy=1 TO ysize
1130 line1$=""
1140 line2$=""
1150 FOR xx=1 TO xsize
1160 chr$=Grid$(xx,yy)
1170 CASE chr$ OF
1180 WHEN "#"  : bot$=CHR$255+CHR$255:top$=bot$
1190 WHEN "."  : bot$="  ":top$=bot$
1200 OTHERWISE : bot$=chr$+" ":top$="  "
1210 ENDCASE
1220 IF clue<=Words THEN
1230 IF xx=x(clue) AND yy=y(clue) THEN
1240 num=VALnames$(clue)
1250 top$=LEFT$(STR$num+" ",2)
1260 clue+=1
1270 IF clue<=Words IF VALnames$(clue)=num clue+=1
1280 ENDIF
1290 ENDIF
1300 line1$+=top$
1310 line2$+=bot$
1320 NEXT
1330 BPUT #file,line1$+CHR$1Ø+line2$
1340 NEXT
1350 BPUT #file,1Ø
1360 ENDPROC
1370 :
```

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```
1380 DEF PROCsolve(grid$(),words$(),clues)
1390 LOCAL bestclue,bestfits$,word,word$,old$
1400 IF clues=Ø THEN
1410 solutions+=1
1420 PROCinfo(Clues-clues,"Solution "+STR$solutions)
1430 IF ans_file PROCshowgrid(ans_file)
1440 IF display PRINTTAB(Ø,ysize+1);
1450 PROCunused(ans_file)
1460 IF display THEN
1470 VDU 7
1480 IF GET
1490 ENDIF
1500 ELSE
1510 :
1520 bestfit=1E38
1530 bestlen=Ø
1540 bestmatch=Ø
1550 :
1560 bestclue=Ø
1570 bestfits$=""
1580 :
1590 clue=1
1600 REPEAT
1610 cluematch=Ø
1620 fits=Ø
1630 fits$=""
1640 IF len(clue)>Ø THEN
1650 FOR word=1 TO Words
1660 word$=words$(word)
1670 len=LENword$
1680 IF len=len(clue) THEN
1690 matches=FNmatch(word$,x(clue),y(clue),dir(clue))
1700 IF matches>=Ø THEN
1710 fits+=1
1720 fits$+=(STR$word+" ")
1730 IF matches>cluematch cluematch=matches
1740 ENDIF
1750 ENDIF
1760 NEXT
1770 ELSE
1780 fits=-1
1790 ENDIF
1800 IF fits>Ø THEN
1810 new=FALSE
1820 IF fits<bestfit new=TRUE
1830 IF fits=bestfit THEN
1840 IF cluematch>bestmatch new=TRUE
1850 IF cluematch=bestmatch THEN
1860 IF len>bestlen new=TRUE
1870 ENDIF
1880 ENDIF
1890 IF new THEN
1900 bestclue=clue
1910 bestfit=fits
1920 bestlen=len
1930 bestmatch=cluematch
1940 bestfits$=fits$
1950 ENDIF
1960 ENDIF
1970 clue+=1
1980 UNTIL clue>Clues OR fits=Ø
1990 IF fits=Ø THEN
2000 PROCinfo(Clues-clues,"No word fits in "+names$(clue-1))
2010 ELSE
2020 WHILE bestfits$<>""
2030 spc=INSTR(bestfits$," ")
2040 word=VALbestfits$
2050 word$=words$(word)
2060 bestfits$=MID$(bestfits$,spc+1)
2070 :
2080 words$(word)=""
2090 len(bestclue)=Ø
2100 old$=FNput(word$,x(bestclue),y(bestclue),dir(bestclue))
2110 :
2120 PROCinfo(Clues-clues,"Trying "+word$+" in "+names$(bestclue))
2130 PROCsolve(grid$(),words$(),clues-1)
2140 PROCinfo(Clues-clues,"Removing "+word$+" from "+names$(bestclue))
2150 words$(word)=word$
2160 len(bestclue)=LENword$
2170 old$=FNput(old$,x(bestclue),y(bestclue),dir(bestclue))
2180 :
2190 ENDWHILE
2200 ENDIF
2210 ENDIF
2220 ENDPROC
2230 :
2240 DEF FNmatch(w$,xm,ym,dir)
2250 i%=1
2260 match=Ø
2270 REPEAT
2280 IF grid$(xm,ym)<>"." THEN
2290 IF grid$(xm,ym)=MID$(w$,i%,1) THEN
2300 match+=1
2310 ELSE
2320 match=-1
2330 ENDIF
2340 ENDIF
2350 xm+=(1-dir)
2360 ym+=dir
2370 i%+=1
2380 UNTIL i%>LENw$ OR match<Ø
2390 =match
2400 :
2410 DEF FNput(w$,xp,yp,dir)
2420 put$ = ""
2430 FOR i% = 1 TO LENw$
2440 put$ += grid$(xp,yp)
2450 grid$(xp,yp)=MID$(w$,i%,1)
2460 IF display VDU 31,xp-1,yp-1:PRINTMID$(w$,i%,1)
2470 xp+=(1-dir)
2480 yp+=dir
2490 NEXT
2500 =put$
2510 :
2520 DEF PROCshowgrid(file)
2530 IF file <> Ø BPUT #file,"Solution "+STR$solutions+CHR$1Ø
2540 FOR yy=1 TO ysize
2550 FOR xx=1 TO xsize
2560 byte=ASCGrid$(xx,yy)
2570 IF byte=ASC"#" byte=255
2580 IF file=Ø THEN
2590 VDU byte
2600 ELSE
2610 BPUT #file,byte
2620 ENDIF
2630 NEXT
2640 IF file=Ø THEN
2650 PRINT
2660 ELSE
2670 BPUT #file,1Ø
2680 ENDIF
2690 NEXT
2700 ENDPROC
2710 :
2720 DEF PROCunused(file)
2730 first=TRUE
2740 FOR i=1 TO Words
2750 IF words$(i)<>"" THEN
2760 str$=""
2770 IF first str$=CHR$1Ø+"Unused words: ":first=FALSE
2780 str$+=words$(i)+" "
2790 IF file <>Ø THEN
2800 BPUT #file,str$;
2810 ENDIF
2820 IF display PRINTstr$;
2830 ENDIF
2840 NEXT
2850 IF NOT first THEN
2860 IF file<>Ø THEN
2870 BPUT #file,CHR$1Ø+CHR$1Ø
2880 ENDIF
2890 IF display PRINT
2900 ENDIF
2910 ENDPROC
2920 :
2930 DEF PROCinfo(tab,text$)
2940 IF inf_file<>Ø THEN
2950 BPUT #inf_file,STRING$(tab," ")+text$
2960 ENDIF
2970 ENDPROC
2980 :
2990 DATA ASS,COG,DUO,DYE,MAD,URN
3000 DATA ATOM,ECHO
3010 DATA ATOLL,ELFIN,HAUNT,INLAY,OKAPI,OLDEN,OMEGA,RACES,SANDY,THORN,ULTRA
3020 DATA GENIAL,TOROID
3030 DATA DESTROY,INSIPID,LATENCY,UNCLEAR
3040 DATA CUPBOARD,EMULSION
3050 DATA ACORNUSER,PROFUSION,SEASHELLS,TYPEFACES
3060 DATA (end)
3070 :
3080 DATA 13,13
3090 DATA .......#...##
3100 DATA .#.#.#.#.#...
3110 DATA .........#.#.
3120 DATA .#.#.#.#.....
3130 DATA .........###.
3140 DATA ##.##.##.....
3150 DATA .#.#.....#.#.
3160 DATA .....##.##.##
3170 DATA .###.........
3180 DATA .....#.#.#.#.
3190 DATA .#.#.........
3200 DATA ...#.#.#.#.#.
3210 DATA ##...#.......
```

Listing 2

```
10 REM >JigWordB
20 REM By David Lawrence
30 REM For B/B+/M/C/E
40 REM (c) BAU April 1991
50 :
60 ON ERROR CLOSE #Ø:REPORT:PRINT" at line ";ERL:END
70 MODE4
80 VDU23;8202;Ø;Ø;Ø;Ø;
90 CLOSE #Ø
100 :
110 ans_file=FNopenfile("Answers")
120 num_file=FNopenfile("Clues")
130 inf_file=FNopenfile("Info")
140 display=TRUE
150 :
160 PROCsetup
170 PROCreadwords
180 PROCreadgrid
190 PROCfindclues
200 IF display PROCshowgrid(Ø)
210 IF inf_file PROCclueloc(num_file)
220 PROCsolve(Clues)
230 :
240 PROCclosefile(ans_file)
250 PROCclosefile(num_file)
260 PROCclosefile(inf_file)
270 END
280 :
290 DEF PROCsetup
300 DIM dir$(1)
310 dir$(Ø)=" Across"
320 dir$(1)=" Down"
330 Across=Ø
340 Down=1
350 VDU 23,255,&FFFF;&FFFF;&FFFF;&FFFF;
360 solutions=Ø
370 crlf$=CHR$13+CHR$1Ø
380 ENDPROC
390 :
400 DEF FNopenfile(file$)
410 IF file$="" THEN =Ø
420 =OPENOUT(file$)
430 :
440 DEF PROCclosefile(handle)
450 IF handle<>Ø CLOSE #handle
460 ENDPROC
470 :
480 DEF PROCreadwords
490 Words=Ø
500 maxlen=Ø
510 REPEAT
520 READ word$
530 IF LENword$>maxlen maxlen=LENword$
540 Words=Words+1
550 UNTIL word$="(end)"
560 Words=Words-1
570 RESTORE
580 DIM Words$(Words),x(Words),y(Words),len(Words),dir(Words),names$(Words)
590 DIM lengths(maxlen)
600 FOR word=1 TO Words
610 READ word$
620 Words$(word)=word$
630 len=LENword$
640 lengths(len)=lengths(len)+1
650 NEXT
660 READ end$
670 ENDPROC
680 :
690 DEF PROCreadgrid
700 READ xsize,ysize
710 DIM Grid$(xsize+1,ysize+1)
720 FOR x=Ø TO xsize+1
730 Grid$(x,Ø)="#"
740 Grid$(x,ysize+1)="#"
750 NEXT
760 FOR y=1 TO ysize
770 READ line$
780 FOR x=Ø TO xsize+1
790 Grid$(x,y)=MID$("#"+line$+"#",x+1,1)
800 NEXT
810 NEXT
820 ENDPROC
830 :
840 DEF PROCfindclues
850 Clues=Ø
860 number=1
870 FOR y=1 TO ysize
880 FOR x=1 TO xsize
890 IF Grid$(x,y)<>"#" PROCposclue
900 NEXT
910 NEXT
920 ENDPROC
930 :
940 DEF PROCposclue
950 start=FALSE
960 IF Grid$(x-1,y)="#" AND Grid$(x+1,y)<>"#" PROCfindlen(x,y,Across)
970 IF Grid$(x,y-1)="#" AND Grid$(x,y+1)<>"#" PROCfindlen(x,y,Down)
980 IF start number=number+1
990 ENDPROC
1000 :
1010 DEF PROCfindlen(xf,yf,dir)
1020 Clues=Clues+1
1030 x(Clues)=xf
1040 y(Clues)=yf
1050 dir(Clues)=dir
1060 len=Ø
1070 REPEAT
1080 xf=xf+1-dir
1090 yf=yf+dir
1100 len=len+1
1110 UNTIL Grid$(xf,yf)="#"
1120 len(Clues)=len
1130 names$(Clues)=STR$number+dir$(dir)
1140 start=TRUE
1150 ENDPROC
1160 :
1170 DEF PROCclueloc(file)
1180 clue=1
1190 FOR yy=1 TO ysize
1200 line1$=""
1210 line2$=""
1220 FOR xx=1 TO xsize
1230 chr$=Grid$(xx,yy)
1240 PROCsettopbot(chr$)
1250 IF clue<=Words IF xx=x(clue) AND yy=y(clue) PROCcluestart
1260 line1$=line1$+top$
1270 line2$=line2$+bot$
1280 NEXT
1290 PROCbput(file,line1$+crlf$+line2$+crlf$)
1300 NEXT
1310 PROCbput(file,crlf$)
1320 ENDPROC
1330 :
1340 DEF PROCsettopbot(c$)
1350 IF c$="#" bot$=CHR$255+CHR$255:top$=bot$:ENDPROC
1360 IF c$="." bot$="  ":top$=bot$:ENDPROC
1370 bot$=chr$+" ":top$="  "
1380 ENDPROC
1390 :
1400 DEF PROCcluestart
1410 num=VALnames$(clue)
1420 top$=LEFT$(STR$num+" ",2)
1430 clue=clue+1
1440 IF clue<=Words IF VALnames$(clue)=num clue=clue+1
1450 ENDPROC
1460 :
1470 DEF PROCsolve(clues)
1480 LOCAL bestclue,bestfits$,word,word$,old$
1490 IF clues=Ø PROCsolution:ENDPROC
1500 bestfit=1E38
1510 bestlen=Ø
1520 bestmatch=Ø
1530 bestclue=Ø
1540 bestfits$=""
1550 clue=1
1560 REPEAT
1570 cluematch=Ø
1580 fits=Ø
1590 fits$=""
1600 fits=FNcluefits
1610 IF fits>Ø THEN IF FNbetter PROCgetbest
1620 clue=clue+1
1630 UNTIL clue>Clues OR fits=Ø
1640 IF fits=Ø PROCinfo(Clues-clues,"No word fits in "+names$(clue-1)):ENDPROC
1650 REM REPEAT
1660 spc=INSTR(bestfits$," ")
1670 word=VALbestfits$
1680 word$=Words$(word)
1690 bestfits$=MID$(bestfits$,spc+1)
1700 Words$(word)=""
1710 len(bestclue)=Ø
1720 old$=FNput(word$,x(bestclue),y(bestclue),dir(bestclue))
```

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```
 1730 PROCinfo(Clues-clues,"Trying "+word$+" in "+names$(bestclue))
 1740 PROCsolve(clues-1)
 1750 PROCinfo(Clues-clues,"Removing "+word$+" from "+names$(bestclue))
 1760 Words$(word)=word$
 1770 len(bestclue)=LENword$
 1780 old$=FNput(old$,x(bestclue),y(bestclue),dir(bestclue))
 1790 IF bestfits$<>"" THEN 1650:REM UNTIL bestfits$=""
 1800 ENDPROC
 1810 :
 1820 DEF PROCsolution
 1830 solutions=solutions+1
 1840 PROCinfo(Clues-clues,"Solution "+STR$solutions)
 1850 IF ans_file PROCshowgrid(ans_file)
 1860 IF display PRINTTAB(0,ysize+1);
 1870 PROCunused(ans_file)
 1880 IF display VDU 7:IFGET
 1890 ENDPROC
 1900 :
 1910 DEF FNcluefits
 1920 IF len(clue)<=0 THEN =-1
 1930 FOR word=1 TO Words
 1940 word$=Words$(word)
 1950 len=LENword$
 1960 IF len=len(clue) PROCwordfits
 1970 NEXT
 1980 =fits
 1990 :
 2000 DEF PROCwordfits
 2010 matches=FNmatch(word$,x(clue),y(clue),dir(clue))
 2020 IF matches<0 ENDPROC
 2030 fits=fits+1
 2040 fits$=fits$+STR$word+" "
 2050 IF matches>cluematch cluematch=matches
 2060 ENDPROC
 2070 :
 2080 DEF FNbetter
 2090 IF fits<bestfit THEN =TRUE
 2100 IF fits>bestfit THEN =FALSE
 2110 IF cluematch>bestmatch THEN =TRUE
 2120 IF cluematch<bestmatch THEN =FALSE
 2130 IF len>bestlen THEN =TRUE
 2140 =FALSE
 2150 :
 2160 DEF PROCgetbest
 2170 bestclue=clue
 2180 bestfit=fits
 2190 bestlen=len
 2200 bestmatch=cluematch
 2210 bestfits$=fits$
 2220 ENDPROC
 2230 :
 2240 DEF FNmatch(w$,xm,ym,dir)
 2250 i%=1
 2260 match=0
 2270 REPEAT
 2280 PROCcheckletter
 2290 xm=xm+1-dir
 2300 ym=ym+dir
 2310 i%=i%+1
 2320 UNTIL i%>LENw$ OR match<0
 2330 = match
 2340 :
 2350 DEF PROCcheckletter
 2360 IF Grid$(xm,ym)="." ENDPROC
 2370 IF Grid$(xm,ym)=MID$(w$,i%,1) match=match+1 ELSE match=-1
 2380 ENDPROC
 2390 :
 2400 DEF FNput(w$,xp,yp,dir)
 2410 put$=""
 2420 FOR i%=1 TO LENw$
 2430 put$=put$+Grid$(xp,yp)
 2440 Grid$(xp,yp)=MID$(w$,i%,1)
 2450 IF display VDU 31,xp-1,yp-1:PRINTMID$(w$,i%,1)
 2460 xp=xp+1-dir
 2470 yp=yp+dir
 2480 NEXT
 2490 = put$
 2500 :
 2510 DEF PROCshowgrid(file)
 2520 IF file<>0 PROCbput(file,"Solution "+STR$solutions+crlf$)
 2530 FOR yy=1 TO ysize
 2540 FOR xx=1 TO xsize
 2550 byte=ASCGrid$(xx,yy)
 2560 IF byte=ASC"#" byte=255
 2570 IF file=0 VDU byte ELSE BPUT #file,byte
 2580 NEXT
 2590 IF file=0 PRINT ELSE PROCbput(file,crlf$)
 2600 NEXT
 2610 ENDPROC
 2620 :
 2630 DEF PROCunused(file)
 2640 first=TRUE
 2650 FOR i=1 TO Words
 2660 wo$=Words$(i)
 2670 IF wo$<>"" PROCspare(wo$)
 2680 NEXT
 2690 IF NOT first IF file<>0 PROCbput(file,crlf$+crlf$):IF display PRINT
 2700 ENDPROC
 2710 :
 2720 DEF PROCspare(spare$)
 2730 str$=""
 2740 IF first str$=crlf$+"Unused words: ":first=FALSE
 2750 str$=str$+spare$+" "
 2760 IF file<>0 PROCbput(file,str$)
 2770 IF display PRINTstr$;
 2780 ENDPROC
 2790 :
 2800 DEF PROCinfo(tab,text$)
 2810 IF inf_file<>0 PROCbput(inf_file,STRING$(tab," ")+text$+crlf$)
 2820 ENDPROC
 2830 :
 2840 DEF PROCbput(f,a$)
 2850 FOR i%=1 TO LEN(a$)
 2860 BPUT #f,ASCMID$(a$,i%,1)
 2870 NEXT
 2880 ENDPROC
 2890 :
 2900 DATA ASS,COG,DUO,DYE,MAD,URN
 2910 DATA ATOM,ECHO
 2920 DATA ATOLL,ELFIN,HAUNT,INLAY,OKAPI,OLDEN,OMEGA,RACES,SANDY,THORN,ULTRA
 2930 DATA GENIAL,TOROID
 2940 DATA DESTROY,INSIPID,LATENCY,UNCLEAR
 2950 DATA CUPBOARD,EMULSION
 2960 DATA ACORNUSER,PROFUSION,SEASHELLS,TYPEFACES
 2970 DATA (end)
 2980 :
 2990 DATA 13,13
 3000 DATA .......#...##
 3010 DATA .#.#.#.#.#...
 3020 DATA .........#.#.
 3030 DATA .#.#.#.#.....
 3040 DATA .........###.
 3050 DATA ##.##.##.....
 3060 DATA .#.#.....#.#.
 3070 DATA .....##.##.##
 3080 DATA .###.........
 3090 DATA .....#.#.#.#.
 3100 DATA .#.#.........
 3110 DATA ...#.#.#.#.#.
 3120 DATA ##...#.......
```

Hattrix

Listing 1

```
   10 REM >PlatEd for HatTrix (Hats1)
   20 REM By Bryan B. Cloud
   30 REM For BBC B/B+/M/C/(A)
   40 REM (c) BAU Apr 1991
   50 :
   60 MODE 2
   70 ON ERROR REPORT:PRINT" at line ";ERL:GOTO 140
   80 VDU 23;8202;0;0;0;0;
   90 PROCinit
  100 PROCload
  110 PROCdraw(s%)
  120 PROCdesign
  130 MODE 0
  140 *FX 4,0
  150 *FX 229,0
  160 *FX 225,1
  170 END
  180 :
  190 DEF PROCinit
  200 screens=4
  210 nplat=41
  220 width=80
  230 height=124
  240 DIM x%(screens-1,nplat),y%(screens-1,nplat)
  250 DIM w%(screens-1,nplat),t%(screens-1,nplat)
  260 DIM cols(4)
  270 FOR col=0 TO 4
  280 READ cols(col)
  290 NEXT
  300 *FX 4,1
  310 *FX 229,1
  320 *FX 225,140
  330 x%=0
  340 y%=0
  350 t%=1
  360 s%=0
  370 ENDPROC
  380 :
  390 DATA 0,1,6,5,2
  400 :
  410 DEF PROCload
  420 file=OPENIN("PlatPos")
  430 FOR i%=0 TO screens-1
  440 nused=0
  450 :
  460 FOR j%=1 TO nplat
  470 yy=(BGET #file)
  480 IF y%<>255 nused=nused+1:yy=yy-32
  490 y%(i%,j%)=yy
  500 NEXT
  510 z=BGET#file
  520 :
  530 FOR j%=1 TO nplat
  540 x%(i%,j%)=BGET #file
  550 NEXT
  560 z=BGET#file
  570 :
  580 FOR j%=1 TO nplat
  590 t%(i%,j%)=BGET #file
  600 w%(i%,j%)=(t%(i%,j%) DIV 4)+1
  610 t%(i%,j%)=(t%(i%,j%) MOD 4)+1
  620 NEXT
  630 z=BGET#file
  640 :
  650 t%(i%,0)=nused
  660 NEXT
  670 CLOSE #file
  680 ENDPROC
  690 :
  700 DEF PROCinfo(s)
  710 COLOUR 7:PRINTTAB(11,1);"Scrn:";
  720 COLOUR 6:PRINT;s+1
  730 COLOUR 7:PRINTTAB(11,3);"Used:";
  740 COLOUR 1:PRINT;t%(s,0);" "
  750 COLOUR 7:PRINTTAB(11,5);"Free:";
  760 COLOUR 2:PRINT;nplat-t%(s,0);" "
  770 ENDPROC
  780 :
  790 DEF PROCdraw(s)
  800 PROCinfo(s)
  810 GCOL 0,128+7
  820 VDU 24,0;0;(width+1)*8+4;(height+1)*8+4;16
  830 GCOL 0,128
  840 VDU 24,8;8;width*8+4;height*8+4;16,26
  850 FOR i=1 TO nplat
  860 PROCplatform(s,i,t%(s,i))
  870 NEXT
  880 ENDPROC
  890 :
  900 DEF PROCplatform(s,i,c)
  910 IF y%(s,i)=255 ENDPROC
  920 GCOL 0,cols(c)
  930 PROCline(x%(s,i),y%(s,i),w%(s,i))
  940 ENDPROC
  950 :
  960 DEF PROCline(x,y,w)
  970 PROCdot(x,y)
  980 PLOT 1,(w-1)*8,0
  990 PLOT 65,0,-4
 1000 PLOT 1,-(w-1)*8,0
 1010 ENDPROC
 1020 :
 1030 DEF PROCdot(x,y)
 1040 PLOT 69,(x+1)*8,(height-y)*8
 1050 PLOT 65,0,4
 1060 ENDPROC
 1070 :
 1080 DEF FNscrn(x,y)
 1090 =POINT((x+1)*8,(height-y)*8)
 1100 :
 1110 DEF PROCdesign
 1120 REPEAT
 1130 key=FNget(x%,y%,t%)
 1140 IF key=136 x%=(x%+width-1) MOD width
 1150 IF key=137 x%=(x%+1) MOD width
 1160 IF key=138 y%=(y%+1) MOD height
 1170 IF key=139 y%=(y%+height-1) MOD height
 1180 IF key>48 AND key<53 t%=key-48
 1190 IF key>140 AND key<145 ss%=key-141:IF ss%<>s% s%=ss%:PROCdraw(s%)
 1200 IF key=32 x%=x%+FNenter(s%,x%,y%,t%)
 1210 IF key=127 PROCdelete(s%,x%,y%)
 1220 IF key=ASC"s" OR key=ASC"S" PROCsave
 1230 UNTIL key=27 AND INKEY-2
 1240 ENDPROC
 1250 :
 1260 DEF FNget(xg,yg,t)
 1270 GCOL 3,cols(t)
 1280 REPEAT
 1290 PROCdot(xg,yg)
 1300 key=INKEY(30)
 1310 PROCdot(xg,yg)
 1320 IF key=-1 key=INKEY(10)
 1330 UNTIL key<>-1
 1340 =key
 1350 :
 1360 DEF FNenter(s,x,y,t)
 1370 IF FNpoint(s,x,y)<>0 OR t%(s,0)=nplat VDU 7:=0
 1380 GCOL 0,cols(t)
 1390 PROCdot(x,y)
 1400 w=0
 1410 REPEAT
 1420 key=FNget(x+w,y,t)
 1430 IF key=136 AND w>0 GCOL 0,0:PROCdot(x+w,y):w=w-1
 1440 IF key=137 AND x+w<width-1 AND w<60 AND FNscrn(x+w+1,y)=0 w=w+1:GCOL 0,cols(t):PROCdot(x+w,y)
 1450 UNTIL key=32 OR key=27
 1460 IF key=27 GCOL 0,0:PROCline(x,y,w+1):key=0:=0
 1470 i=1
 1480 gap=0
 1490 REPEAT
 1500 IF y%(s,i)=255 gap=i
 1510 i=i+1
 1520 UNTIL i>nplat OR gap<>0
 1530 IF gap=0 PRINT"Help!":END
 1540 x%(s,gap)=x
 1550 y%(s,gap)=y
 1560 w%(s,gap)=w+1
 1570 t%(s,gap)=t
 1580 t%(s,0)=t%(s,0)+1
 1590 PROCinfo(s)
 1600 =w
 1610 :
 1620 DEF FNpoint(s,x,y)
 1630 i%=1
 1640 p%=0
 1650 REPEAT
 1660 IF y=y%(s,i%) AND x>=x%(s,i%) AND x<x%(s,i%)+w%(s,i%) p%=i%
 1670 i%=i%+1
 1680 UNTIL i%>nplat OR p%<>0
 1690 =p%
 1700 :
 1710 DEF PROCdelete(s,x,y)
 1720 IF INKEY-1 AND INKEY-2 PROCdelall(s):ENDPROC
 1730 del%=FNpoint(s,x,y)
 1740 IF del%=0 ENDPROC
 1750 PROCplatform(s,del%,0)
 1760 y%(s,del%)=255
 1770 t%(s,0)=t%(s,0)-1
 1780 PROCinfo(s)
 1790 ENDPROC
 1800 :
 1810 DEF PROCdelall(s)
```

Continued ▶

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```
1820 FOR i=1 TO nplat
1830 PROCplatform(s,i,Ø)
1840 y%(s,i)=255
1850 NEXT
1860 t%(s,Ø)=Ø
1870 PROCinfo(s)
1880 ENDPROC
1890 :
1900 DEF PROCsave
1910 file=OPENOUT("PlatPos")
1920 FOR s=Ø TO screens-1
1930 FOR i=1 TO nplat-1
1940 k=i
1950 FOR j=i+1 TO nplat
1960 IF y%(s,j)<y%(s,k) OR (y%(s,j)=y%(s,k) AND x%(s,j)<x%(s,k)) k=j
1970 NEXT
1980 z=y%(s,i):y%(s,i)=y%(s,k):y%(s,k)=z
1990 z=x%(s,i):x%(s,i)=x%(s,k):x%(s,k)=z
2000 z=w%(s,i):w%(s,i)=w%(s,k):w%(s,k)=z
2010 z=t%(s,i):t%(s,i)=t%(s,k):t%(s,k)=z
2020 NEXT
2030 :
2040 FOR i=1 TO nplat
2050 yy=y%(s,i)
2060 IF yy<>255 yy=yy+32
2070 BPUT #file,yy
2080 NEXT
2090 BPUT #file,255
2100 :
2110 FOR i=1 TO nplat
2120 BPUT #file,x%(s,i)
2130 NEXT
2140 BPUT #file,255
2150 :
2160 FOR i=1 TO nplat
2170 BPUT #file,(t%(s,i)-1)+4*(w%(s,i)-1)
2180 NEXT
2190 BPUT #file,255
2200 :
2210 NEXT
2220 CLOSE #file
2230 ENDPROC
```

Listing 2

```
   10 REM >MakeSpr For HatTrix (Hat2)
   20 REM By Bryan B. Cloud
   30 REM For Archimedes only!
   40 REM (c) BAU Apr 1991
   50 :
   60 MODE 2
   70 OFF
   80 DIM c%(15)
   90 FOR i%=Ø TO 15
  100 FOR b%=Ø TO 3
  110 IF (i% AND (1<<b%))>Ø THEN c%(i%)+=1<<(2*b%)
  120 NEXT
  130 NEXT
  140 *Sload Sprites
  150 PROCsprites("spring",5,12,16,8,"SprDat")
  160 PROCsprites("girder",4,8,8,8,"GirDat")
  170 PROCsprites("hat",8,16,8,8,"HatDat")
  180 PROCsprites("clue",9,8,8,4,"ClueDat")
  190 END
  200 :
  210 DEF PROCsprites(spr$,num,x,y,l,file$)
  220 out%=OPENOUT(file$)
  230 FOR i%=Ø TO num-1
  240 OSCLI"Schoose "+spr$+STR$i%
  250 PLOT &ED,Ø,Ø
  260 PROCwritespr(x,y,l)
  270 NEXT
  280 CLOSE #out%
  290 ENDPROC
  300 :
  310 DEF PROCwritespr(w%,h%,l%)
  320 FOR row%=(h% DIV l%)-1 TO Ø STEP -1
  330 FOR col%=Ø TO w%/2-1
  340 FOR subrow%=l%-1 TO Ø STEP -1
  350 p1%=POINT(16*col%,l%*4*row%+4*subrow%)
  360 p2%=POINT(16*col%+8,l%*4*row%+4*subrow%)
  370 BPUT#out%,2*c%(p1%)+c%(p2%)
  380 NEXT
  390 NEXT
  400 NEXT
  410 ENDPROC
```

Pieces of Eight

Listing 1

```
   10 REM Maze (Po81)
   20 REM by David Lawrence
   30 REM for BBC B/B+/M/E/(A)
   40 REM (c) BAU April 1991
   50 :
   60 IF PAGE>&11ØØ THEN PROCreloc:REM Arc users remove this line
   70 :
   80 MODE 1:HIMEM=&2EØØ
   90 PROCinit
  100 REPEAT
  110 PROCreset
  120 PROCmaze
  130 PROCgame
  140 PROCend
  150 UNTIL done
  160 MODE 7
  170 *FX 200,Ø
  180 END
  190 :
  200 DEF PROCinit
  210 VDU 19,1,4;Ø;19,2,7;Ø;19,3,4;Ø;
  220 VDU 23;8202;Ø;Ø;Ø;
  230 DIM D%(4,2),L%(13)
  240 FOR I%=1 TO 4
  250 READ D%(I%,1),D%(I%,2):NEXT
  260 FOR I%=1 TO 13:READ L%(I%):NEXT
  270 VDU 23,224,255,255,255,255,255,255,255,255
  280 VDU 23,225,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
  290 VDU 23,226,Ø,Ø,6Ø,6Ø,6Ø,6Ø,Ø,Ø
  300 VDU 23,227,129,66,36,24,24,36,66,129
  310 VDU 23,228,255,129,189,189,185,189,189,189
  320 VDU 23,229,24,6Ø,24,255,153,6Ø,36,1Ø2
  330 done=FALSE:M%=&2EØØ
  340 rnd=RND(-TIME)
  350 *FX 2ØØ,1
  360 ENDPROC
  370 :
  380 DEF PROCpoke(xp%,yp%,by%)
  390 ?(M%+xp%+yp%*21)=by%
  400 ENDPROC
  410 :
  420 DEF FNpeek(xp%,yp%)
  430 =?(M%+xp%+yp%*21)
  440 :
  450 DEF PROCreset
  460 exit=FALSE:box=FALSE:S%=6
  470 FOR I%=Ø TO 5ØØ STEP 4:I%!M%=Ø
  480 NEXT
  490 out=FALSE:f%=1
  500 VDU 26,12
  510 GCOL Ø,2:MOVE 16,16:PLOT 1,Ø,288
  520 PLOT 1,1248,Ø:PLOT 1,Ø,-288
  530 PLOT 1,-1248,Ø
  540 MOVE 272,16:PLOT 1,Ø,288
  550 COLOUR 2:PRINTTAB(1,3Ø);"Scans:6"
  560 ENDPROC
  570 :
  580 DEF PROCmaze
  590 PRINTTAB(Ø,2)"Please wait, constructing maze>";SPC(99);"<=Finished when";
  600 PRINTSPC(27);"arrow gets here.";TAB(3Ø,2);
  610 X%=1:Y%=1:xm%=2:ym%=2
  620 PROCpoke(2,2,1):N%=99
  630 FOR N%=1 TO 99
  640 REPEAT:ok%=TRUE
  650 REPEAT
  660 D%=RND(4):xx%=X%+D%(D%,1)
  670 yy%=Y%+D%(D%,2)
  680 UNTIL xx%>Ø AND xx%<11 AND yy%>Ø AND yy%<11
  690 IF FNpeek(xx%*2,yy%*2) PROCjump
  700 UNTIL ok%
  710 FOR I%=1 TO 2
  720 PROCpoke(X%*2+I%*D%(D%,1),Y%*2+I%*D%(D%,2),1)
  730 NEXT
  740 X%=xx%:Y%=yy%:VDU 32,62,8
  750 IF X%>xm% xm%=X%
  760 IF Y%>ym% ym%=Y%
  770 NEXT
  780 PROCpoke(RND(1Ø)*2,1,4)
  790 X%=RND(1Ø)*2:Y%=2Ø:D%=RND(3)+1
  800 REPEAT
  810 tx%=RND(1Ø)*2:ty%=RND(1Ø)*2
  820 UNTIL tx%<>X% AND ty%<>Y%
  830 PROCpoke(tx%,ty%,2)
  840 ENDPROC
  850 :
  860 DEF PROCjump
  870 REPEAT
  880 X%=RND(xm%):Y%=RND(ym%):ok%=FALSE
  890 UNTIL FNpeek(X%*2,Y%*2)
  900 ENDPROC
  910 :
  920 DEF PROCgame
  930 TIME=Ø
  940 REPEAT
  950 PROCview(X%,Y%,D%)
  960 R%=FNpeek(X%,Y%)
  970 IF R%=2 PROCboxfound
  980 IF R%=4 PROCexitfound
  990 IF NOT out PROCmove
 1000 UNTIL out
 1010 ENDPROC
 1020 :
 1030 DEF PROCview(x%,y%,d%)
 1040 VDU 26,28,Ø,21,39,Ø,12,26
 1050 VDU 29,64Ø;8ØØ;
 1060 GCOL Ø,2
 1070 MOVE 639,2ØØ:PLOT 1,Ø,-68Ø
 1080 PLOT 1,-1279,Ø:PLOT 1,Ø,68Ø
 1090 PLOT 1,1279,Ø
 1100 VDU 24,-634;-476;634;196;
 1110 xa%=D%(d%,1):ya%=D%(d%,2)
 1120 N%=2:x1%=L%(1)
 1130 REPEAT
 1140 x2%=L%(N%):R%=FNpeek(x%,y%)
 1150 N%=FNroom(x%,y%,d%,R%)
 1160 x1%=x2%:x%=x%+xa%:y%=y%+ya%
 1170 UNTIL N%=13 OR N%=Ø
 1180 ENDPROC
 1190 :
 1200 DEF FNroom(x%,y%,d%,R%)
 1210 IF R%=Ø THEN =Ø
 1220 y1%=-x1%*.75:y2%=-x2%*.75
 1230 y3%=x2%*.3125:y4%=x1%*.3125
 1240 FOR i%=-1 TO 1
 1250 PROCside(x%,y%,i%)
 1260 NEXT
 1270 IF FNpeek(x%+D%(d%,1),y%+D%(d%,2))=Ø PROCendwall
 1280 IF R%=2 PROCbox
 1290 IF R%=3 PROCcross
 1300 IF R%=4 PROCexit
 1310 =N%+1
 1320 :
 1330 DEF PROCside(ax%,ay%,i%)
 1340 ax%=ax%+D%(FNturn(d%-i%),1)
 1350 ay%=ay%+D%(FNturn(d%-i%),2)
 1360 r1%=FNpeek(ax%,ay%)
 1370 IF r1%>Ø AND i%=Ø ENDPROC
 1380 IF r1%=Ø PROCwall(i%):ENDPROC
 1390 PROCopen(i%)
 1400 IF r1%=3 PROCsidecross(i%)
 1410 ENDPROC
 1420 :
 1430 DEF FNturn(q%)=(q%+1) MOD 4+1
 1440 :
 1450 DEF PROCwall(i%)
 1460 IF i%=Ø ENDPROC
 1470 GCOL Ø,d%+i%
 1480 IF f% MOVE x1%*i%,y1%:MOVE x1%*i%,y4%:PLOT 85,x2%*i%,y2%:PLOT 85,x2%*i%,y3%
 1490 GCOL Ø,2
 1500 MOVE x1%*i%,y1%:DRAW x1%*i%,y4%
 1510 DRAW x2%*i%,y3%:DRAW x2%*i%,y2%
 1520 DRAW x1%*i%,y1%
 1530 ENDPROC
 1540 :
 1550 DEF PROCendwall
 1560 GCOL Ø,d%
 1570 IF f% MOVE -x2%,y2%:MOVE x2%,y2%:PLOT 85,-x2%,y3%:PLOT 85,x2%,y3%
 1580 GCOL Ø,2
 1590 MOVE -x2%,y2%:DRAW x2%,y2%
 1600 DRAW x2%,y3%:DRAW -x2%,y3%
 1610 DRAW -x2%,y2%
 1620 N%=Ø
 1630 ENDPROC
 1640 :
 1650 DEF PROCopen(i%)
 1660 GCOL Ø,d%
 1670 IF f% MOVE x2%*i%,y2%:MOVE x1%*i%,y2%:PLOT 85,x2%*i%,y3%:PLOT 85,x1%*i%,y3%
 1680 GCOL Ø,2
 1690 MOVE x2%*i%,y2%:DRAW x1%*i%,y2%
 1700 DRAW x1%*i%,y3%:DRAW x2%*i%,y3%
 1710 DRAW x2%*i%,y2%
 1720 ENDPROC
 1730 :
 1740 DEF PROCcross
 1750 GCOL Ø,2
 1760 MOVE -x2%,y2%:DRAW x1%,y1%
 1770 MOVE -x1%,y1%:DRAW x2%,y2%
 1780 ENDPROC
 1790 :
 1800 DEF PROCsidecross(i%)
 1810 GCOL Ø,2
 1820 MOVE x2%*i%,y2%
 1830 DRAW x1%*i%,(7*y2%+y1%)/8
 1840 ENDPROC
 1850 :
 1860 DEF PROCbox
 1870 GCOL Ø,1
 1880 wi=x2%/1.5:he=x2%/1Ø
 1890 de=x2%/6:ba=x2%/1.9
 1900 MOVE -wi/2,(y2%+y1%)/2
 1910 PLOT Ø,wi,Ø
 1920 PLOT 81,-wi,-he:PLOT 81,wi,Ø
 1930 PLOT Ø,-wi,he:PLOT Ø,wi,Ø
 1940 PLOT 85,-ba/2,(y2%+y1%)/2+de
 1950 PLOT 81,ba,Ø
 1960 GCOL Ø,2
 1970 MOVE -wi/2,(y2%+y1%)/2
 1980 PLOT 1,wi,Ø
 1990 PLOT 1,Ø,-he:PLOT 1,-wi,Ø
 2000 PLOT 1,Ø,he
 2010 DRAW -ba/2,(y2%+y1%)/2+de
 2020 PLOT 1,ba,Ø:DRAW wi/2,(y2%+y1%)/2
 2030 ENDPROC
 2040 :
 2050 DEF PROCexit
 2060 IF D%<>3 ENDPROC
 2070 wi=x2%/1.5:he=x2%/1.2
 2080 GCOL Ø,Ø
 2090 IF f% MOVE -wi/2,y2%:PLOT Ø,wi,Ø:PLOT 81,-wi,he:PLOT 81,wi,Ø
 2100 GCOL Ø,2:MOVE -wi/2,y2%
 2110 PLOT 1,Ø,he
 2120 PLOT 1,wi,Ø:PLOT 1,Ø,-he
 2130 ENDPROC
 2140 :
 2150 DEF PROCmove
 2160 REPEAT:go%=TRUE:*FX 21
 2170 REPEAT:k$=GET$
 2180 UNTIL INSTR("FCSZX:/",k$):REM Arc users change : to '
 2190 IF k$="F" f%=1-f%:SOUND 1,-1Ø,2ØØ,1
 2200 IF k$="C" go%=FNdocross
 2210 IF k$="S" go%=FNscan
 2220 IF k$="Z" D%=D%-1:IF D%=Ø D%=4
 2230 IF k$="X" D%=D%+1:IF D%=5 D%=1
 2240 IF k$="/" D%=D%+2:IF D%>4 D%=D%-4
 2250 IF k$= ":" go%=FNforward:REM Arc users change : to '
 2260 UNTIL go%
 2270 ENDPROC
 2280 :
 2290 DEF FNforward
 2300 ax%=X%+D%(D%,1):ay%=Y%+D%(D%,2)
 2310 IF FNpeek(ax%,ay%)=Ø THEN =Ø
 2320 X%=ax%:Y%=ay%
 2330 =1
 2340 :
```

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```
 235Ø DEF FNdocross
 236Ø p%=FNpeek(X%,Y%)
 237Ø IF p%=3 OR p%=4 THEN =Ø
 238Ø PROCpoke(X%,Y%,3)
 239Ø GCOL Ø,2
 24ØØ MOVE -484,-363:DRAW 774,-58Ø
 241Ø MOVE -774,-58Ø:DRAW 484,-363
 242Ø =Ø
 243Ø :
 244Ø DEF FNscan
 245Ø LOCAL I%,J%
 246Ø IF S%=Ø SOUND 1,-15,2Ø,1:=Ø
 247Ø S%=S%-1:PRINTTAB(7,3Ø);S%
 248Ø VDU 28,1,3Ø,7,23
 249Ø old%=FNpeek(X%,Y%)
 25ØØ PROCpoke(X%,Y%,5)
 251Ø FOR I%=X%-3 TO X%+3
 252Ø FOR J%=Y%-3 TO Y%+3
 253Ø IF I%<1 OR I%>21 OR J%<1 OR J%>21c
h%=225 ELSE ch%=224+FNpeek(I%,J%)
 254Ø io%=I%-X%+3:jo%=J%-Y%+3:VDU 31
 255Ø IF D%=1 VDU io%,6-jo%
 256Ø IF D%=2 VDU 6-jo%,6-io%
 257Ø IF D%=3 VDU 6-io%,jo%
 258Ø IF D%=4 VDU jo%,io%
 259Ø VDU ch%
 26ØØ NEXT:NEXT
 261Ø VDU 26
 262Ø PROCpoke(X%,Y%,old%)
 263Ø =Ø
 264Ø :
 265Ø DEF PROCboxfound
 266Ø VDU 28,9,3Ø,38,23
 267Ø PRINT"Well Done! - You have found"
'"the treasure."'
 268Ø IF exit PRINT"Now get back to the
exit again"
 269Ø IF NOT exit PRINT"Now go and find
the exit"
 27ØØ PRINT'"  Press <SPACE> to continue
."
 271Ø REPEAT
 272Ø UNTIL INKEY-99:VDU 12,26
 273Ø box=TRUE:PROCpoke(X%,Y%,1)
 274Ø ENDPROC
 275Ø :
 276Ø DEF PROCexitfound
 277Ø IF exit AND NOT box ENDPROC
 278Ø VDU 28,9,3Ø,38,23
 279Ø IF box out=TRUE:ENDPROC
 28ØØ PRINT"Well Done! - You have found"
'"the exit."'
 281Ø PRINT"However, you have not found"
'"the treasure. GO AND FIND IT!"'
 282Ø PRINT"  Press <SPACE> to continue.
"
 283Ø REPEAT
 284Ø UNTIL INKEY-99
 285Ø VDU 12,26:exit=TRUE
 286Ø ENDPROC
 287Ø :
 288Ø DEF PROCend
 289Ø t%=TIME
 29ØØ VDU 28,Ø,21,39,Ø,12,26
 291Ø VDU 28,9,21,3Ø,Ø
 292Ø FOR i%=21 TO 1 STEP -1
 293Ø FOR j%=1 TO 21
 294Ø VDU 224+FNpeek(j%,i%)
 295Ø NEXT:PRINT
 296Ø NEXT
 297Ø VDU 28,9,3Ø,38,23
 298Ø PRINT"Well Done! - You have found"
''"the exit.  ";
 299Ø PRINT"You took >";t% DIV 36ØØØØ MO
D 24;":";t% DIV 6ØØØ MOD 6Ø;
 3ØØØ PRINT".";t% DIV 1ØØ MOD 6Ø;"<"
 3Ø1Ø PRINT''"Do you want another game (
Y/N)"
 3Ø2Ø REPEAT
 3Ø3Ø k$=GET$
 3Ø4Ø UNTIL k$="Y" OR k$="N"
 3Ø5Ø IF k$="N" done=TRUE
 3Ø6Ø ENDPROC
 3Ø7Ø :
 3Ø8Ø DEF PROCreloc
 3Ø9Ø PRINT"Relocating..."
 31ØØ *TAPE
 311Ø *KEYØ FOR X%=Ø TO (TOP-PAGE) STEP
4:X%!&11ØØ=X%!PAGE:NEXT:PAGE=&11ØØ|MOLD|
MRUN|F|M
 312Ø VDU 21:*FX 138,Ø,128
 313Ø END
 314Ø :
 315Ø DATA Ø,1,1,Ø,Ø,-1,-1,Ø
 316Ø DATA 774,484,3ØØ,2Ø8,156
 317Ø DATA 12Ø,96,76,56,4Ø,28,16,Ø
```

Listing 2

```
   1Ø REM Fractals Listing 1 (Po82)
   2Ø REM by Susan Stepney
   3Ø REM for all machines
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø MODE 1
   7Ø INPUT "Mode Ø, 1, or 2 "M%
   8Ø IF M%>2 THEN M%=2
   9Ø INPUT "Initial A (1 to 4) : "Ainit
  1ØØ IF Ainit<1 Ainit=1
  11Ø INPUT "Maximum A ="Amax
  12Ø IF Amax<Ainit THEN Amax=4
  13Ø :
  14Ø MODE M%
  15Ø VDU23;82Ø2;Ø;Ø;Ø;
  16Ø step%=2^(M%+1)
  17Ø scale=(Amax-Ainit)/128Ø
  18Ø z=RND(1)
  19Ø :
  2ØØ FOR X%=Ø TO 1279 STEP step%
  21Ø A=X%*scale+Ainit

  22Ø IF A<2.95 cycle%=2 ELSE cycle%=2Ø
  23Ø :
  24Ø FOR Y%=1 TO cycle%
  25Ø z=A*z*(1-z)
  26Ø NEXT Y%
  27Ø FOR Y%=1 TO cycle%
  28Ø z=A*z*(1-z)
  29Ø Z%=z*1Ø23
  3ØØ PLOT 69,X%,Z%
  31Ø NEXT Y%
  32Ø NEXT X%
  33Ø END
```

Listing 3

```
   1Ø REM Fractals Listing2 (Po83)
   2Ø REM by Susan Stepney
   3Ø REM for B/B+/M/C/E
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø INPUT "A (Ø - 3.5) : "A
   7Ø IF A=Ø A=3.5
   8Ø INPUT "Duration of note : "time%
   9Ø IF time%=Ø time%=1
  1ØØ z=RND(1)
  11Ø REPEAT
  12Ø z=A*z*(1-z)
  13Ø SOUND 1,-15,z*255,time%
  14Ø UNTIL FALSE
```

Listing 4

```
   1Ø REM Fractals Listing 3 (Po84)
   2Ø REM by Susan Stepney
   3Ø REM for all machines
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø MODE Ø
   7Ø VDU23;82Ø2;Ø;Ø;Ø;
   8Ø z=RND(1)
   9Ø FOR J%=1Ø23 TO Ø STEP -4
  1ØØ R=J%*2.4414Ø625E-4
  11Ø :
  12Ø FOR K%=Ø TO J%*Ø.1+2
  13Ø z=Ø.5+SGN(RND)*SQR(Ø.25-z*R)
  14Ø I%=z*1279
  15Ø PLOT 69,I%,J%
  16Ø I%=1279-I%
  17Ø PLOT 69,I%,J%
  18Ø NEXT K%
  19Ø NEXT J%
  2ØØ END
```

Listing 5

```
   1Ø REM Fractals Listing 4 (Po85)
   2Ø REM by Susan Stepney
   3Ø REM for all machines
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø REz=Ø:IMz=Ø
   7Ø MODE Ø
   8Ø INPUT "A [3] "A
   9Ø IF A=Ø A=3
  1ØØ INPUT "X Scaling [1ØØØ] "S%
  11Ø IF S%=Ø S%=1ØØØ
  12Ø INPUT "Relative magnification in Y
 [1] "S2%
  13Ø IF S2%=Ø S2%=1
  14Ø :
  15Ø MODE Ø
  16Ø VDU 29,64Ø;512;
  17Ø VDU23;82Ø2;Ø;Ø;Ø;
  18Ø :
  19Ø I%=Ø
  2ØØ IA=4/A
  21Ø :
  22Ø REPEAT
  23Ø I%=I%+1
  24Ø var1=1-REz*IA
  25Ø var2=IMz*IA
  26Ø R=SQR(var1*var1+var2*var2)
  27Ø CS=var1/R
  28Ø var3=R*(1+CS)*Ø.5
  29Ø IF var3<Ø var3=Ø
  3ØØ REy=SQR(var3)
  31Ø var3=R*(1-CS)*Ø.5
  32Ø IF var3<Ø var3=Ø
  33Ø IMy=SQR(var3)
  34Ø S=SGN(RND)
  35Ø REz=Ø.5+S*Ø.5*REy
  36Ø S=SGN(RND)
  37Ø IMz=S*Ø.5*IMy
  38Ø X%=(REz-Ø.5)*S%
  39Ø Y%=IMz*S%*S2%
  4ØØ PLOT 69,X%,Y%
  41Ø PLOT 69,-X%,Y%
  42Ø PLOT 69,-X%,-Y%
  43Ø PLOT 69,X%,-Y%
  44Ø UNTIL INKEY (-113)
  45Ø :
  46Ø DEF PROCend
  47Ø PRINTTAB(Ø,Ø)"A = ";A
  48Ø PRINTTAB(5Ø,Ø)"Magnification = ";S
%
  49Ø PRINTTAB(Ø,1);I%;" Iterations."
  5ØØ PRINTTAB(5Ø,1)"y Magnification = "
;S2%
  51Ø END
```

Listing 6

```
   1Ø REM Fratals Listing 5 (Po86)
   2Ø REM by Susan Stepney
   3Ø REM For all machines
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø REz=Ø
   7Ø IMz=Ø
   8Ø INPUT "Scale [1ØØØ] : "S%
   9Ø IF S%=Ø S%=1ØØØ
  1ØØ INPUT "Real part of A : "REA$
  11Ø REA=EVAL(REA$)
  12Ø INPUT "Imaginary part : "IMA$
  13Ø IMA=EVAL(IMA$)
  14Ø MODE Ø
  15Ø VDU 29,64Ø;512;
  16Ø VDU 23;82Ø2;Ø;Ø;Ø;
  17Ø I%=Ø
  18Ø AMOD=REA*REA+IMA*IMA
  19Ø IA=4/AMOD
  2ØØ :
  21Ø REPEAT
  22Ø I%=I%+1
  23Ø var1=1-(REz*REA+IMz*IMA)*IA
  24Ø var2=(IMA*REz-IMz*REA)*IA
  25Ø R=SQR(var1*var1+var2*var2)
  26Ø CS=var1/R
  27Ø REy=SQR(R*(1+CS)*Ø.5)
  28Ø IMy=R*(1-CS)*Ø.5
  29Ø IF IMy<Ø IMy=Ø
  3ØØ IMy=SQR(IMy)
  31Ø S=SGN(RND)
  32Ø REz=Ø.5+S*Ø.5*REy
  33Ø S=SGN(RND)
  34Ø IMz=S*Ø.5*IMy
  35Ø X%=(REz-Ø.5)*S%
  36Ø Y%=IMz*S%
  37Ø :
  38Ø PLOT 69,X%,Y%
  39Ø PLOT 69,-X%,Y%
  4ØØ PLOT 69,-X%,-Y%
  41Ø PLOT 69,X%,-Y%
  42Ø :
  43Ø UNTIL INKEY (-113)
  44Ø PRINTTAB(Ø,Ø);I%;" Iterations"
  45Ø PRINTTAB(4Ø,Ø)"scale = ";S%
  46Ø PRINTTAB(Ø,1);"A = ";REA;" + ";IMA
," i = ";REA$;" + ";IMA$;" i"
  47Ø END
```

Listing 7

```
   1Ø REM Four sound effects (Po87)
   2Ø REM by Joe Telford
   3Ø REM (c) BAU April 1991
   4Ø REM For B/B+/M/C
   5Ø :
   6Ø PRINT "Press a key"
   7Ø key=GET
   8Ø PRINT"Siren Number 1"
   9Ø ENVELOPE 1,Ø,2,-2,2,6,12,6,127,Ø,Ø
,-127,126,Ø
  1ØØ SOUND 1,1,128,6Ø
  11Ø :
  12Ø PRINT "Press a key"
  13Ø key=GET
  14Ø PRINT"Siren Number 2"
  15Ø FOR cycle=1 TO 1Ø
  16Ø SOUND 1,-15,128,6
  17Ø SOUND 1,-15,11Ø,6
  18Ø NEXT cycle
  19Ø :
  2ØØ PRINT "Press a key"
  21Ø key=GET
  22Ø PRINT"Siren Number 3"
  23Ø ENVELOPE 1,3,1,1,-2,1Ø,1Ø,Ø,127,Ø,
Ø,-127,126,Ø
  24Ø SOUND 1,1,128,6Ø
  25Ø :
  26Ø PRINT "Press a key"
  27Ø key=GET
  28Ø PRINT"It's for youhoo!"
  29Ø ENVELOPE 1,Ø,1,1,1,1,1,1,127,Ø,Ø,-
127,126,Ø
  3ØØ FOR cycle=1 TO 3
  31Ø SOUND 1,1,128,1Ø
  32Ø SOUND 1,Ø,128,6
  33Ø SOUND 1,1,128,14
  34Ø SOUND 1,Ø,128,2Ø
  35Ø NEXT cycle
  36Ø END
```

Exile Editor

Listing 1

```
   1Ø REM Ed (Games1)
   2Ø REM by Jonathon Hunt
   3Ø REM for B/B+/M/C/E and Exile
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø :
   7Ø HIMEM=&78ØØ
   8Ø FOR A%=Ø TO &3FC STEP 4
   9Ø A%!&78ØØ=A%!&2CØØ
  1ØØ NEXT
  11Ø :
  12Ø $&7ØØ="Unsaved"
  13Ø CHAIN"Editor"
```

Listing 2

```
   1Ø REM Exile Data File Editor (Games2
)
   2Ø REM by Jonathan Hart
   3Ø REM for B/B+/M/C/E and Exile
   4Ø REM (c) BAU April 1991
   5Ø :
   6Ø MODE 7
   7Ø HIMEM=&78ØØ
   8Ø PROCasm
   9Ø PROCinit
  1ØØ REPEAT
  11Ø opt%=FNmenu
  12Ø *FX 4
  13Ø IF opt%=1 PROCenergy
  14Ø IF opt%=2 PROCpockets
  15Ø IF opt%=3 PROClocate
  16Ø IF opt%=4 PROCequip
  17Ø IF opt%=5 PROCmiscell
  18Ø IF opt%=6 PROCio("Load","")
  19Ø IF opt%=7 CALL &922:PROCio("Save",
"+4ØØ Ø 2CØØ")
  2ØØ PRINT TAB(Ø,24)"Done.";
  21Ø REPEAT UNTIL INKEY(-129)
  22Ø REPEAT
  23Ø UNTIL INKEY(-99) OR INKEY(-74)
  24Ø UNTIL FALSE
  25Ø END
```

Continued ▶

◀ **Continued**

```
  26Ø :
  27Ø DEF PROCasm
  28Ø LOCAL a%,b%,c%,a$
  29Ø P%=&9ØØ
  3ØØ FOR a%=Ø TO 12
  31Ø READ a$
  32Ø b%=Ø
  33Ø FOR c%=Ø TO 8
  34Ø [OPT2:EQUB EVAL("&"+MID$(a$,1+2*c%
,2)):]
  35Ø b%=b% EOR P%?TRUE
  36Ø NEXT
  37Ø IF b%<>EVAL("&"+RIGHT$(a$,2)) PRIN
T'"Error: "a$:END
  38Ø NEXT
  39Ø ENDPROC
  4ØØ :
  41Ø DATA A2A6AØFCA9ØØ8D11Ø9/64
  42Ø DATA A9788D12Ø9A9DC4DØØ/7F
  43Ø DATA ØØEE11Ø9DØØ3EE12Ø9/DØ
  44Ø DATA E8DØF2C8DØEF6Ø2ØØØ/7D
  45Ø DATA Ø98D5A7BA9998D2F78/4F
  46Ø DATA A93C8D3478A949DØØ2/66
  47Ø DATA A9458D61Ø9A982851B/BC
  48Ø DATA A9FC851CA9788D5DØ9/C4
  49Ø DATA 8D6ØØ9AØØØA96E85ØØ/Ø6
  5ØØ DATA A99238F865ØØ691585/67
  51Ø DATA ØØ59ØØØØ99ØØØØ45ØØ/85
  52Ø DATA C8DØØ6EE5DØ9EE6ØØ9/23
  53Ø DATA E61BDØE5E61CDØE16Ø/63
  54Ø :
  55Ø DEF PROCinit
  56Ø *Fx 11 2Ø
  57Ø *Fx 12 3
  58Ø @%=&9Ø3
  59Ø VDU 23;82Ø2;Ø;Ø;Ø;
  6ØØ LOCAL a%
  61Ø DIM obj$(99)
  62Ø FOR a%=Ø TO 99
  63Ø READ obj$(a%)
  64Ø NEXT
  65Ø title$=CHR$134+CHR$141+"Exile Data
 File Editor"
  66Ø IF $&7ØØ<>"Unsaved" fsp$="/none/"
ELSE fsp$="/unsaved/":CALL &936:IF (USR(
&9ØØ)AND&FF)<>?&7B5A OR ?&782F<>&99 OR ?
&7834<>&3C fsp$=CHR$7+"Bad data!"
  67Ø sm%=FALSE
  68Ø ENDPROC
  69Ø :
  7ØØ DEF FNobject(a$,c%)
  71Ø LOCAL a%,aa%,b%
  72Ø CLS
  73Ø PRINT a$
  74Ø VDU 28,Ø,24,39,2
  75Ø FOR a%=Ø TO 22
  76Ø aa%=(a%+c%+89)MOD1ØØ
  77Ø PRINT'aa%" "obj$(aa%);
  78Ø NEXT
  79Ø a%=c%+89
  8ØØ *FX 4 1
  81Ø REPEAT
  82Ø VDU 31,Ø,11,133,1Ø,127,11,11,32
  83Ø *FX 15 1
  84Ø b%=GET
  85Ø IF b%=139 a%=(a%+99)MOD1ØØ:VDU3Ø,1
1:PRINT a%" "obj$(a%);
  86Ø IF b%=138 a%=(a%+1)MOD1ØØ:aa%=(a%+
22)MOD1ØØ:VDU31,Ø,22:PRINT'aa%" "obj$(aa
%);
  87Ø UNTIL b%=13 OR b%=32
  88Ø VDU 26
  89Ø =(a%+11)MOD1ØØ
  9ØØ :
  91Ø DEF FNmenu
  92Ø LOCAL a%,a$,b$
  93Ø a$=CHR$1Ø+CHR$131
  94Ø b$=")"+CHR$13Ø
  95Ø VDU 22,7,28,6,24,39,Ø
  96Ø PRINT title$'title$
  97Ø PRINT"  File:"CHR$133fsp$
  98Ø PRINT'''a$;1b$"Energy management"
  99Ø PRINTa$;2b$"(Un-)fill pockets"
 1ØØØ PRINTa$;3b$"Relocater"
 1Ø1Ø PRINTa$;4b$"(De-)equip"
 1Ø2Ø PRINTa$;5b$"Miscellany"
 1Ø3Ø PRINT'a$;6b$"Load data"
 1Ø4Ø PRINTa$;7b$"Save data"
 1Ø5Ø PRINT'''"  Choose an option... ";
 1Ø6Ø REPEAT *Fx 15 1
 1Ø7Ø a%=GET
 1Ø8Ø UNTIL a%>&3Ø AND a%<&38
 1Ø9Ø VDU 26,12
 11ØØ =a%-&3Ø
 111Ø :
 112Ø DEF PROCenergy
 113Ø PRINT'CHR$133"Energy management"''
''
 114Ø PROCe2("Jetpack",&5C)
 115Ø PROCe2("Pistol",&5D)
 116Ø PROCe2("Icer",&5E)
 117Ø PROCe2("Blaster",&5F)
 118Ø PROCe2("Plasma gun",&6Ø)
 119Ø PROCe2("Prot. suit",&61)
 12ØØ ENDPROC
 121Ø :
 122Ø DEF PROCe2(a$,a%)
 123Ø LOCAL a
 124Ø IF NOT(a%=&5C OR a%?&77BA>&7F) PRI
NT TAB(Ø,2*a%-&BØ)"You have no "a$:ENDPR
OC
 125Ø inf%=(a%>&5C AND a%<&61)
 126Ø IF inf% PRINT TAB(Ø,24)"999 for in
finite";
 127Ø IF inf%=TRUE AND a%?&78Ø6=Ø b$="in
f." ELSE b$=STR$((1+a%?&78ØØ)/8)
 128Ø PRINT TAB(Ø,2*a%-&BØ)a$" had "b$"M
J";:INPUT". Now MJ="a
 129Ø PRINT TAB(Ø,24)STRING$(16," ");
 13ØØ IF a=Ø ENDPROC
 131Ø IF a=999 AND inf%=TRUE a%?&78ØØ=-1
:a%?&78Ø6=Ø ELSE a%?&78ØØ=8*a-1:IF inf%
a%?&78Ø6=EVAL("&"+MID$("Ø61ØFF32",2*a%-&
B9,2))
 132Ø ENDPROC
 133Ø :
 134Ø DEF PROCpockets
 135Ø LOCAL a%
 136Ø FOR a%=1 TO 4
 137Ø IF a%>?&784F a%?&784F=53
 138Ø a%?&784F=FNobject("Select pocket "
+STR$(5-a%),a%?&784F)
 139Ø NEXT
 14ØØ ?&784F=4
 141Ø PRINT TAB(Ø,23)SPC(7Ø);
 142Ø ENDPROC
 143Ø :
 144Ø DEF PROCio(a$,b$)
 145Ø PRINT'CHR$133a$''''
 146Ø INPUT"Filename: "fsp$
 147Ø PRINT"Drive: ";:REPEAT:a%=GET-&3Ø:
UNTIL a%>-1 AND a%<4:PRINT a%:OSCLI("Dri
ve "+STR$a%)
 148Ø $&7ØØ=a$+" "+fsp$+" 78ØØ"+b$
 149Ø X%=Ø
 15ØØ Y%=7
 151Ø CALL &FFF7
 152Ø CALL &936
 153Ø ENDPROC
 154Ø :
 155Ø DEF PROClocate
 156Ø LOCAL a%,b%,a$,b$
 157Ø PRINT'CHR$133"Relocater"''''
 158Ø PRINT"Current position was X,Y = &
";~?&7899",&";~?&78BC
 159Ø INPUT"    New position is  X,Y = "
a$,b$
 16ØØ ?&7899=EVALa$
 161Ø ?&78BC=EVALb$
 162Ø FOR a%=1 TO 4
 163Ø b%=(4+?&7829-a%)MOD4
 164Ø IF a%>?&782A b%?&782B=&99:b%?&783Ø
=&3C
 165Ø PRINT'"Teleport ";a%" was X,Y = &"
;~b%?&782B",&";~b%?&783Ø
 166Ø INPUTSPC(5)"...is now X,Y = "a$,b$
 167Ø b%?&782B=EVALa$
 168Ø b%?&783Ø=EVALb$
 169Ø NEXT
 17ØØ PRINT'"Teleport 5 is  X,Y = &99,&3
C"
 171Ø ?&782A=4
 172Ø ENDPROC
 173Ø :
 174Ø DEF PROCequip
 175Ø LOCAL a%
 176Ø PRINT'CHR$133"(De-)equip"''
 177Ø FOR a%=81 TO 99
 178Ø VDU a%-16,&84-2*(a%?&77BD>&7F)
 179Ø IF a%=85 PRINT"Key: Purple tile" E
LSE IF a%=88 PRINT"Key: Blue tile & Pink
" ELSE PRINT obj$(a%)
 18ØØ NEXT
 181Ø REPEAT
 182Ø a%=GET
 183Ø IF a%>64 AND a%<84 a%?&77CD=a%?&77
CD EOR &FF:VDU 31,1,a%-61,&84-2*(a%?&77C
D>&7F)
 184Ø UNTIL a%=13 OR a%=32
 185Ø ENDPROC
 186Ø :
 187Ø DEF PROCmiscell
 188Ø LOCAL a%,b%
 189Ø PRINT'CHR$133"Miscellany"'''
 19ØØ PRINT"Deaths were: ";!&78ØB AND &F
FFFF
 191Ø INPUT" ...are now: "a%
 192Ø ?&78ØB=a%
 193Ø ?&78ØC=a% DIV &1ØØ
 194Ø ?&78ØD=a% DIV &1ØØØØ
 195Ø b%=!&78Ø7 DIV 5Ø
 196Ø PRINT''" Time was: ";b%" sec."
 197Ø INPUT"...is now: "a%
 198Ø !&78Ø7=5Ø*a%
 199Ø PRINT''"Health was: ";?&792E
 2ØØØ INPUT" ...is now: "?&792E
 2Ø1Ø IF sm%=TRUE PRINT''"Smart bomb act
ivated" ELSE PRINT''"Smart bomb (Y/N)? "
;:REPEAT a%=GET AND &DF:UNTIL a%=78 OR a
%=89:VDU a%:IF a%=89 FOR a%=1 TO 15:a%?&
792E=Ø:NEXT:sm%=TRUE
 2Ø2Ø ENDPROC
 2Ø3Ø :
 2Ø4Ø DATA Clone,Chatter: Charged,Pericl
es crew member,Furling,Hive: Small,Hive:
 Large,Frogman: Red,Frogman: Green,Frogm
an: Cyan,Red dripper
 2Ø5Ø DATA Green blob,Yellow thing,Bush:
 Slow,Bush: Push/pull,Big fish,Worm,Pira
nha,Wasp,Grenade: Live,Bullet: Icer
 2Ø6Ø DATA Bullet: Pink,Cannonball,Purpl
e deathball,Bullet: Red,Bullet: Pistol,P
lasma ball,Buzzyball,Invisibuzzyball,Dal
ek: Pink,Dalek: Red
 2Ø7Ø DATA Dalek: Blue,Turret: Inactive
white,Turret: Mad green,Harry,Eddie,Alex
,Mike,Dave,Triax,Maggot
 2Ø8Ø DATA Mad gargoyle,Imp: Pink,Imp: R
ed#1,Imp: Blue,Imp: Cyan,Imp: Red#2,Bird
: Yellow,Bird: White,Bird: Red,Bird: Gre
en
 2Ø9Ø DATA Electric shock,Mushroom: Red,
Mushroom: Blue,/nothing/,Red drip,Fire,C
hatter: Uncharged,Homing fireball,Moveab
le wall,Engine fire
 21ØØ DATA Door: Metal horiz.,Door: Meta
l vert.,Door: Tile h.,Door: Tile v.,Roun
d bush,Teleporter,Switch,Chest,Harmless
explosion,Boulder
 211Ø DATA Cannon,Plasma cannon,Chunk of
 machinery,Wotsit,Destinator,Energy pod,
Urn: Empty,Urn: Full,RCD,CRCD
 212Ø DATA Grenade,Key: Cyan,Key: Orange
,Key: Green,Key: Yellow,Coronium,Key: Re
d,Key: Blue,Coronium fragments,Booster
 213Ø DATA Pistol,Icer,Blaster,Plasma gu
n,Protection suit,Immunity: Fire,Immunit
y: Mushroom,Whistle #1,Whistle #2,Immuni
ty: Radiation
```


Turn to page 99 for more details.

Midnight Graphics Products

Midnight Tracer

!Paint to !Draw conversion, turn your sprite files into fully editable object orientated draw files which can be scaled, rotated and manipulated without any loss of detail.

Ideal for users of all Desktop Publishing and Scanning packages. Accepts any sprite file and offers many image processing facilities. Translation can be colour or monochrome, includes a unique automatic tracing feature, variable trace options and curve fitting facilities.

The manual includes a user friendly tutorial with hints and tips on how to obtain the best results from your sprite files.

!Tracer is an ARM coded Risc OS multitasking application and will easily run on a 1Mb machine.

Midnight Tracer £52.13

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Master 128 .... £369

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** monitor has 0.26 dot pitch and Sony Trinitron tube.

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MEG-A3000!

If you want to expand your A3000's storage capacity and load applications a bit faster, a hard disc drive is the solution. **PAUL JAMES** looks at three options

When you get frustrated by the BBC A3000's floppy disc drive (and let's face it, it can be a bottleneck when it comes to working quickly), what is the alternative for fast, convenient storage of your programs?

Well, whether you are a hoarder of demos, games and public domain software, or use your A3000 for more serious purposes, such as desktop publishing, the answer is – a hard disc drive.

Basically, a hard disc drive consists of several rigid discs mounted on precision bearings. They spin constantly and at a much faster rate than floppy disc drives, and are contained in a sealed case to keep out dust. The read/write head (or heads) can move at great speeds across the discs to pick or save data.

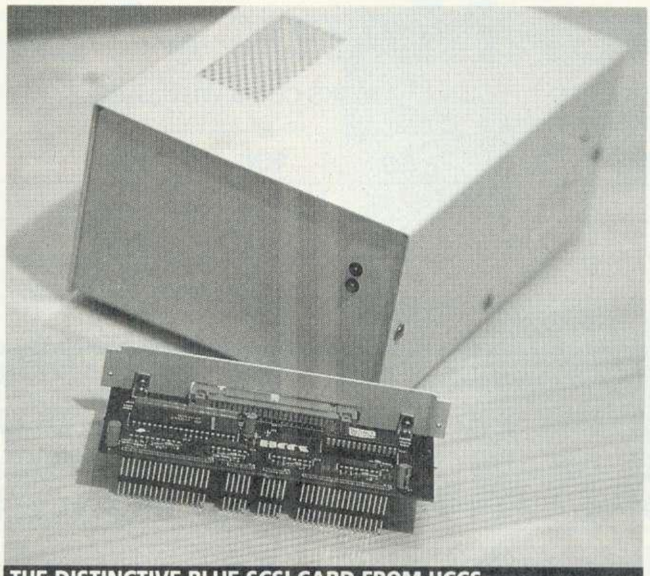
The result of all this precision engineering is that a hard drive can operate much faster and more reliably than a floppy drive and, of course, it offers considerably more storage capacity.

With a hard disc drive attached, there is no need to search for, say, your fonts disc when the computer needs it – you can keep the fonts folder on the root directory on the hard disc. Likewise, with the system folder. Applications, particularly file-dependent programs, also become more convenient to use.

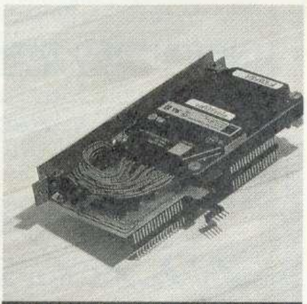
Unlike the Archimedes 400 series, the BBC A3000 was never designed with a hard disc drive in mind. It has only one podule socket – the Arc can have four. Even with podule racking systems, only one podule can be active at any one time, and you have to switch between them manually. So therein lies the problem – a hard drive is something you want to have up and working all the time, alongside other pieces of hardware.

There is also the A3000 internal expansion port, but this is non-standard, and no drive designed for the A400 will fit in here.

So what is available if you want to add a hard disc drive to your A3000? Well, rather than look at every individual drive on the market, the drives reviewed here have been chosen to demonstrate three different ways of adding a hard disc drive to the A3000. A list of suppliers of similar drives is included on page 95.



THE DISTINCTIVE BLUE SCSI CARD FROM HCCS



ICS INTERNAL HARD DRIVE

MORLEY

The first offering comes from Morley Electronics. The controller is a standard Archimedes podule in a sturdy metal case which slots into the external expansion (podule) socket. The cable that connects the podule to the drive looks dangerously like a Centronics-to-Centronics cable – but isn't.

The drive itself is in a smart, compact case together with its power supply and small fan. I had the 40Mb drive, but Morley also does a 20Mb and other sizes can be made to order.

The interface is a standard ADFS ST506, used by Acorn in the 400 series, and if you need to re-format it you can use the Acorn formatter supplied on the support disc.

It is very quick and the tedium of waiting for things to load almost disappears. It can seem noisy, but that is something that results from being an external (rather than internal) drive. It is a simple plug-in-and-go unit, and behaves like a large and fast floppy drive. The only way of expanding this system is to buy a larger hard drive and dispose of the old one.

HCCS

SCSI (Small Computers System Interface) was developed for personal computers as a standard, multi-purpose interface to transfer data at high speed. This is the interface that HCCS has adopted for its hard disc system, which Acorn uses in the latest A540.

The distinctive blue SCSI card fits into the internal expansion socket, leaving the external socket free for an Arc podule, such as a scanner or sound sampler. The card connects via a ribbon cable to an elephantine case which contains the hard drive, its power supply and an awful lot of air.

The hard drive itself (a 48Mb ST157N) is the SCSI version of the ST151 used by Morley. It doesn't have a fan, but runs cooler than the Morley because of the copious amount of air around it, and the comfortably over-rated

power supply.

When turned on, the drive sounds like a jumbo jet ready to take off – a bit of an exaggeration, perhaps, but it is much noisier than the Morley model. You have to turn the drive on at least 30sec before the computer so that it can wind up and initialise itself. If you click on the drive icon before it has done so, a time-out error is reported and you have to reset the A3000.

The drive and card supplied for review were rather slow. This is not a feature of SCSI, but of the software controlling it and the actual drive itself. I understand that HCCS has since modified the software and that the SCSI option is running notably faster, although for the smaller drives, HCCS admits the drive is still slightly slower than the Morley option. Larger SCSI drives run much faster. HCCS has also included new software, a Risc OS drive formatter and a disc examiner.

Expansion of the SCSI system is achieved by purchasing a cable with a loose end on it, plugging another hard drive into it and daisy chaining them together. The drive supplied has a terminator fitted so it must be the last in the chain. Each drive has to be configured as a separate SCSI device by setting an identity number, but the pins to change the ID of the HCCS drive are hidden away beneath the power supply, making it difficult to do so.

Up to seven devices can be connected (the eighth being the host A3000 itself), giving massive storage space.

For Econet managers wishing to move onto Level Four, an A3000 with a large SCSI drive, or drives, would be a cheap and effective fileserver.

IDE

The third drive, from Ian Copestake Software, tackles the problem in a unique way – it is an internally-fitted drive.

The drive is a minute Prairietek or Conner 20Mb IDE (Integrated Drive Electronics) unit. IDE is becoming an increasingly popular standard and prices are falling fast. It is quick and controllers are simple and cheap because most of the necessary electronics are built into the drive. IDE drives were designed with PC portables in mind and they are said to be very robust.

The drive is mounted on an internal expansion board, together with the necessary interface. On removing the drive from its voluminous packaging, a small slip of paper fell out which informed me that a mistake had been made on the circuit board. This has been fixed by using two jumper wires – this doesn't affect the working of the drive, but it does make it rather difficult to plug it in.

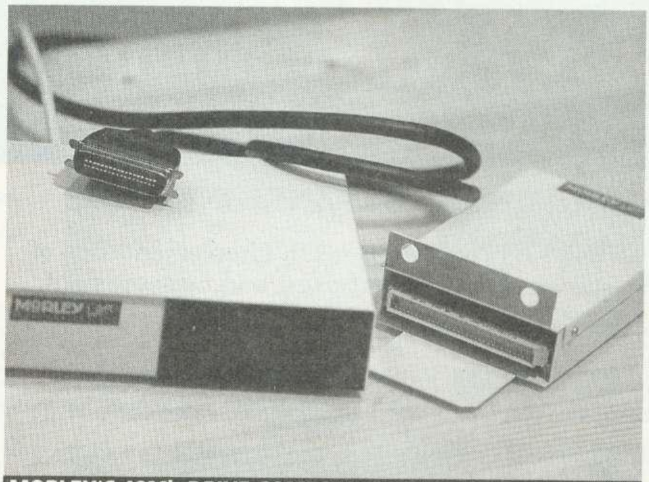
ICS should be praised for the instruction manual. It is clear, concise and even warns you about moving software-protected applications, such as Beebug's *Ovation*.

When you have the drive installed, there is no external sign of it. Maybe it would be a good idea to have a small label warning people that there is a hard drive inside, especially in schools where computers are moved around. No matter how robust, I still wouldn't like to move it while it's turning. There is also no drive LED telling you that the drive is being accessed, but this would be a little impractical.

After you've configured the A3000 to use the new IDEFS filing system, you can use the drive just like a normal ADFS disc, most of the commands being derived from the Filecore module. However, there are a couple specific to IDEFS – most notably the ability to have the drive park (move the heads to a safe area of the disc) and switch itself off after a set time. So, if you load up a wordprocessor to write or play a game, the drive will turn off automatically and turn on again when it is needed, thus saving power.

You can also software write-protect the drive, but this can be turned off by a simple star command (it would be nice to see this incorporated into a password feature which would be great in schools).

The IDE drive is as quick as the Morley drive in normal use, but with the Power off option set, it takes a short time to wind up again. This is incredibly quick, almost unnoticeable, because the single disc is only 2.5in across and has very little mass. A fan is an optional extra and clips onto the card to stir the air around inside the case, recommended if you have any other expansions.



MORLEY'S 40Mb DRIVE COMES IN A STURDY METAL CASE

The internal drive is a beautiful solution. ICS is still waiting for the official OK from Acorn that the A3000 can actually power such a drive, but many are in use and ICS has not heard of any problems so far. I left mine running all night (without a fan) and the surface of the A3000's power supply did not seem any hotter than normal.

The drive is 20Mb – not really enough for normal use, but ICS is currently looking at a 40Mb version. But, if you're worried about size, a further drive of a larger capacity can be added via the external socket on the back of the card.

CONCLUSION

The three drives here represent three different ways of dealing with the addition of a hard disc. They are not the only options, but it is worth considering carefully whether you want an external or internal drive (the ICS drive is the only one in the latter category).

The Morley solution is fast, neat and offers useful storage capacity. The SCSI from HCCS, which is physically large and a bit noisy, is nonetheless ideal for hoarders of large amounts of data.

The ICS internal, apart from being unique, is quick, quiet and incredibly convienient. But it currently offers limited capactity, 20Mb is not enough for normal use and you may find yourself having to store drawfiles, etc, on floppies.

AVAILABLE A3000 HARD DISC DRIVES

(Prices include VAT)

- Ian Copestake internal IDE drive: 20Mb, £431.25.
- HCCS internal SCSI card and external drive: 20Mb, £401.35; 48Mb, £574.85; 118Mb, £1033.85.
- Morley external ST506 podule and drive: 20Mb, £458.85; 40Mb, £573.85; 55Mb, £711.85.
- Worra external SCSI podule and drive: 20Mb, £401.35; 45Mb, £573.85; 80Mb, £746.35; 100Mb, £971.75; 200Mb, £1431.75.
- Pres ST506: 20Mb, £458.85; 40Mb, £573.85.(Needs monitor stand, system housing and expansion card case).
- Technomatic internal SCSI card with user port: £205.85.
- Watford internal SCSI card and external drive: 20Mb, £412.85; 40Mb, £562.35.
- Serial Port SCSI drives (add £80 for external casing and cables): 48Mb, £274.85; 83Mb, £401.35; 111Mb, £631.35; 676Mb, £2300.
- Beebug SCSI drives with internal controller card: 20Mb, £468.84; 45Mb, £573.84; 80Mb, £688.84; 180Mb, £1033.85.

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

The Pineapple Software Real Time Colour Video Digitiser is now supplied with not just one, but two fully multitasking application programs! In fact the software supplied with each Digitiser comprises at least four different programs, (the number is increasing all the time). Included in these is the !Micci application which is probably the most user friendly of all video processing programs. (See photo).

HARDWARE

The Digitiser hardware consists of a double width podule which plugs straight into the back of a 300 or 400 series Archimedes. (Note that a podule backplane is required in 300 series computers).

For A3000 owners we supply a special inexpensive adapter box which contains the digitiser card and plugs into the back of the A3000 using a ribbon cable.

Inputs are provided for PAL composite video and also R,G,B. Manual adjustment of Contrast, Saturation and Brightness provide for ease of initial setting up.

SOFTWARE

The Heart of the Digitiser software is a relocatable module which contains all the video processing routines. All of the previously mentioned software applications access these routines in various ways. For the user who can write simple BASIC programs this module provides easy access to all of the Digitiser routines via '*' commands and SWI's

The new multitasking software makes life very easy for those who wish to incorporate images into Wordprocessing, Desktop publishing, or Art packages. The ease with which grabbed images can be 'zoomed in' and 'cropped' to the required size has to be seen to be believed, and when the required part of the image is selected, it is then a simple matter to 'drag' the image directly into another application.

As well as providing it's own powerful processing routines the Pineapple Digitiser can just as easily use software such as ChangeFSI or AIM to process it's images giving unrivaled versatility.

Also now available in the Multitasking software is a routine to allow capture of a sequence of frames. The number which can be stored depends on the amount of memory you have available (and the size of image chosen), and when grabbed the images can be stored to disc or transferred to PAINT for analysis.

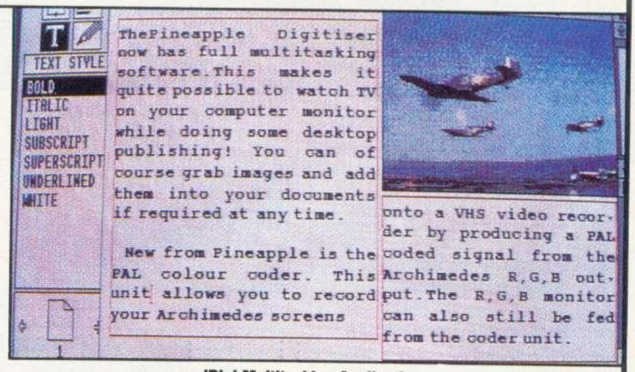
EXCLUSIVE FEATURES

The Pineapple Software Real Time Colour Digitiser is the only one currently ilable with the following exclusive features:-

1. 16 bit operation (extended version) for smoother colour graduations.
2. Two independent multitasking applications plus other powerful software.
3. Digitising of the full video area normally displayed on a TV screen.
4. R,G,B inputs providing higher quality pictures from professional video equipment.

SPECIFICATION

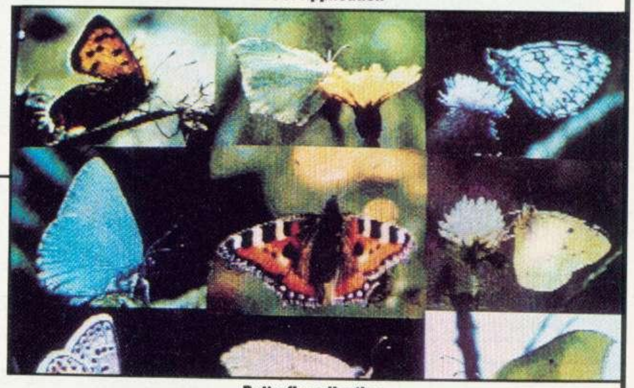
Video Inputs	Pal coded video. 75 volts – 2.5 volts pk to pk. R,G,B, & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192k Ram Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256k Ram
Picture Area	The Digitiser hardware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.



!Digi Multitasking Application



!MICCI Application



Butterfly collection

PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder video unit. This unit produces a full colour coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:-

1. External to computer – no podule slots required.
2. Complete sync pulse regeneration to provide the best possible signal for recording onto VHS recorders or displaying on TV monitors.
3. Switch selectable to 624 or 625 line operation – for interlaced or non-interlaced screen modes.
4. Plugs into R,G,B, computer socket and provides buffered output to feed Archimedes monitor, + coded signal output.
5. Adaptable for use with other computers or R,G,B and Sync signal sources.

Price £69.00 + VAT p&p free

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

– 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' –

Acorn User – April 90

Digitiser Prices

Standard	**£285.00**
Extended	**£315.00**
A3000 Adaptor Box	**£65.00**

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NEW LOW PRICES!!! NEW LOW PRICES!!!

BBC PCB Designer

NEW LOW PRICES!!! NEW LOW PRICES!!!

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input rountine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price. *Acorn User* – Aug 88

PRICE		
	EManual track routing	£55.00
	Auto track routing	£85.00
	Plotter Driver	£35.00

P&P free

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RB2/115	Archimdes £45.00
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Replacement lead to convert 101 series to Archimdes. £12.50

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Access

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Archimedes

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440/1	£1699
The Learning Curve	£699
Arc. Learning Curve	£1299
Jet Set Pack	£649

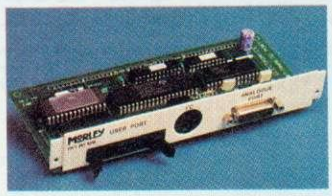
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Optional PSU	£9.50

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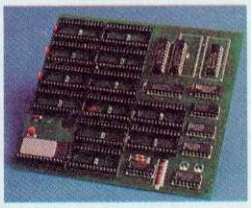
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Built-in features include:

- Freeze program at any point.
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- Allows most protected software to be backed up including disc to tape and tape to disc.

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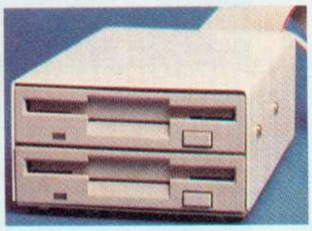
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- High quality japanese drive.
- Includes full fitting kit and instructions

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Kit includes:

- 5.25" 40/80 track drive
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32K NON VOLATILE RAM Cartridge (ideal for Spellmaster Dictionary) £33

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SCSI HARD DISK DRIVES

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Including SCSI podule, drive, cable & leads. A3000 drives also include drive case and switch mode power supply.

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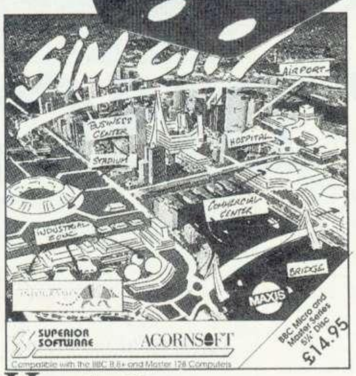
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GAMES



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Special offer	£13.95	Special offer	£17.95	Special offer	£11.95
Saving	£1	Saving	£1	Saving	£1

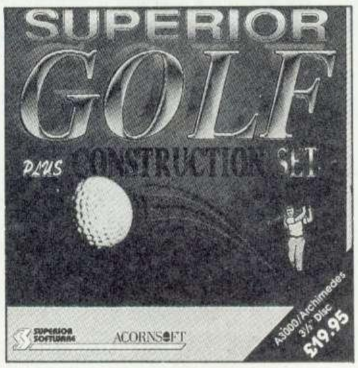
Hostages



You are the head of the Terrorist Combat Squad. An urgent call comes from the Minister for National Security. An embassy has been overrun by terrorists, and you've been put in charge of all operations. Your first priority is to place all your crack hitmen in strategic positions throughout the neighbourhood, without getting themselves shot. You then have to get your team of specialist paratroopers into the embassy and save the hostages without any loss of life. There are many potential death traps to trick you — these terrorists are no pushover! The pressure is on . . . and it's your move.

A3000/Archimedes

RRP	£19.95	Special offer	£17.95
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Superior Golf

This is the complete golfing game for one to four players, plus there are full-feature hole and course construction facilities. This realistic golf simulation is for any level of player – novice to professional. You can also play on your choice of six of the most famous courses in the world. You will soon work out how to avoid the usual golfing hazards – water, bunkers, light and heavy rough, trees and the slope of the green.

When you've mastered the sport of golf, you can design and construct your own holes and courses with the easy-to-use, but very powerful, Hole Editor and Course Editor. Then you can enjoy playing a round on your very own masterpiece.

A3000/Archimedes

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Play it again Sam 13



This four-game compilation from Superior has yet another collection of excellent games to get the year off to a cracking start. Barbarian 2 is a game of skill and strategy and your objective is to overcome the gruesome monsters. For classic fans, there's an exciting 'bat n' ball' clone – Hyperball. Of course, everyone loves Percy Penguin, a classic and highly addictive game. Percy must kill the Snobees by hurling ice cubes at them. And Pandemonium breaks out when you try to construct the core against all odds. Intrigued? This compilation is a must for your collection.

BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
RRP	£11.95	RRP	£14.95	RRP	£9.95
Special offer	£10.95	Special offer	£13.95	Special offer	£8.95
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Play it again Sam 14

Another in this series of games anthologies, this is the very latest from Superior. You've seen the movie . . . now play the game! Play your part as Schwarzenegger the Predator, fighting through the South American jungle. But, beware the lurking alien. Ballistix is a different kind of ball game. And you don't have to play alone. Have the neighbours around for a league competition, and see whose yard the ball finally falls in. And speaking of balls, Superior Soccer is pitched in to this best yet PIAS. Star Port completes the ensemble. It's a brand new arcade adventure that will transport you into space to save the station's medical supplies.

To become a hero though, you need to first look at page 108, and order your copy of Play it again Sam 14.

BBC B/Master (5.25in)		BBC B/Master (3.5in)		Electron cassette	
RRP	£11.95	RRP	£14.95	RRP	£9.95
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Hostages	-	-	20016 £17.95 ❑
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PIAS 14	20022 £10.95 ❑	20023 £13.95 ❑	-
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Design

The Publisher is a powerful desktop publishing package featuring its own page description language and special Wysiwyg preview mode, allowing you to operate it from *View*, *Wordwise Plus* and other wordprocessors. For the BBC model B, Master 128 and Master Compact.

	5.25in	3.5in
The Publisher	1712 £49.95 ❑	1711 £49.95 ❑

Euclid 2 is the ultimate Risc OS 3D design package. It allows you to create a complex object from simple building blocks and rotate them in real time. Scenes can be lit realistically and even exported to *Draw* and *Paint*.

	Archimedes
Euclid 2	21001 £50.00 ❑

Overseas Subscriptions

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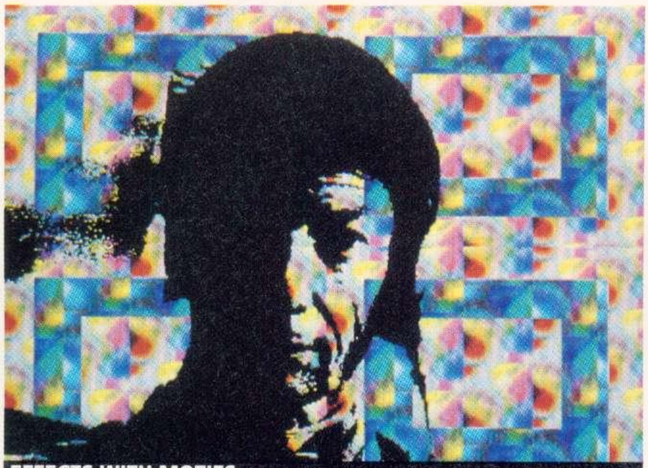
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EFFECTS WITH MOTIFS

ARTISTIC REVELATION

Educational software house, Longman Logotron, has just released its new art package, Revelation. **ROB MILLER** takes paint brush in hand and draws his conclusions

Until now, *Paint* has been the only true Risc OS art program for the BBC A3000/Archimedes. Many programs have been written to design and manipulate pictures, but they have all been mode dependent, ie, they only work in one particular mode.

The whole philosophy behind the Risc OS desktop environment is that applications (programs) can be loaded into the computer, and run alongside each other in any mode. While most applications are designed to run in mode 12 (16 colours), an art package obviously benefits from the greater number of colours available (256) in modes 13 and 15.

Longman Logotron's new art package, *Revelation,* has been designed to cater for all those who wish to illustrate while they wordprocess, desktop publish, or whatever. Complex pictures (sprites) can be designed and then dropped directly into documents.

Revelation comes on a single disc accompanied by a brief but informative A4 manual, which has been designed to be more of a reference guide rather than a tuitional. It details what the various options within *Revelation* are, rather than what you can do with them.



WASH AND BLUR IN ACTION

LOADING UP

On loading the package, its icon appears on the icon bar in the usual way. A menu gives access to user-definable settings, like whether you wish subsequent menus to appear on the left or right of the screen (useful for left-handed people).

An option labelled Special also controls the way in which menus appear. With it on, all submenus appear as they normally would in Risc OS, although now, they can be 'torn-off' the main menu and 'stuck' anywhere else on the screen. This makes selection much easier and removes the need for constant movement through several levels of submenu each time a new tool, for example, is required. The Special option can be turned off for those who prefer the stricter Risc OS standard.

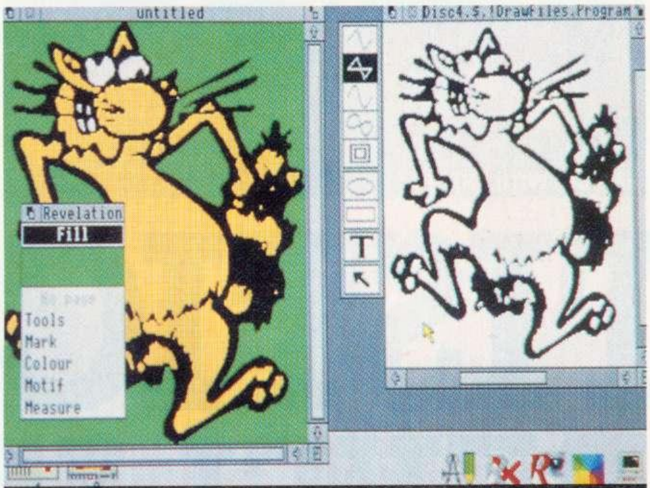
By clicking on the *Revelation* icon, a page size can be chosen. Pictures can be anything from 3.61 × 3.61cm (approx 1/20th the size of the screen) to 57.25 × 57.35cm (approx 12.5 times the size of the screen). Creation of a page is simply a case of stretching a rectangle to the desired size and clicking on OK.

No option is given for specifying height and width numerically (by typing in numbers), which means *Revelation* is aimed more at designing pictures rather than being an advanced sprite editor. Further proof of this is that once a page size has been selected, there is no way of deleting rows or columns of pixels, as in *Paint*. This is not a minus point against *Revelation*, although it should be made clear what purpose the package is meant to serve.

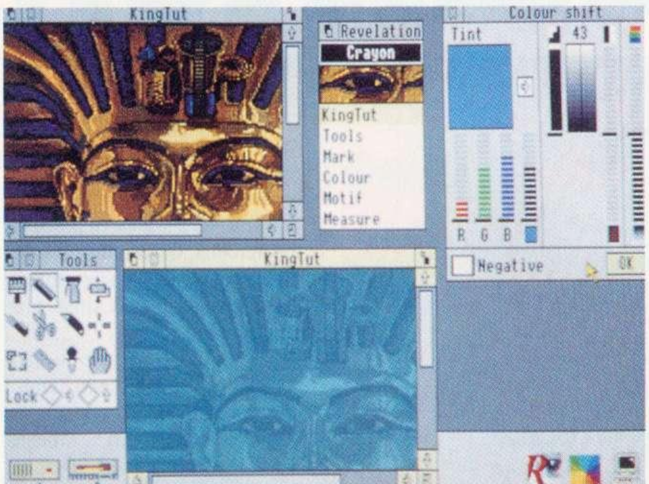
Once a page has been created, it appears, together with the main menu, which remains on screen.

FEATURES

Revelation is able to implement a number of useful features with the minimum of work. A pixel editor can be created by simply calling up a

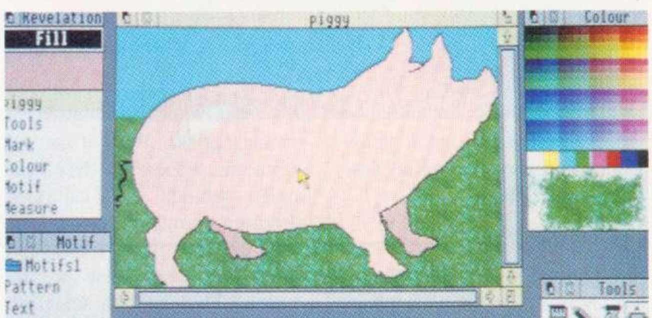


DRAWFILES CAN BE IMPORTED AS SPRITES



COLOUR SHIFT GIVES OVERALL CONTROL OF TONE

SUCCESSIVE CHANGES CAN BE MADE TO ANY IMAGE IN ORDER TO OBTAIN DIFFERENT STYLES OF PICTURES



REVELATION IN FULL SWING

second (or third, etc) scaled view of the current picture. Because everything happens in separate windows, the user can organise the layout of the screen exactly to his or her liking. A drawing tool can now be selected by clicking on the Tool option and then choosing one from the window. All tools are represented by meaningful icons, ie, a brush for painting, and scissors for cutting out areas, and so on.

Like other art programs, *Revelation* allows the user to paint in either single colours, or by using a sprite as the brush. These sprites are referred to as motifs and can be anything from a single pixel, to a sprite several screens in size.

Motifs can be treated in a number of ways – they can be simply painted on, or used to create a kind of wallpaper pattern effect. Motifs can be any shape, including text, and a special Text option allows messages of up to 40 characters to be created from any available outline font. Character size is specified in points for both height and width. Two new fonts – Futura (actually Futura Black), a kind of bold poster style, and Script, a joined-up handwriting style – are supplied on the disc.

Colours can be selected in a number of ways. The colour submenu is basically a palette of shades available in the chosen mode. In 256 colour modes, there is the extra choice of 'washes', which are colours that can be mixed with existing pictures. Using washes on a grey-scale digitised picture gives an effect reminiscent of the late Andy Warhol's pop-art style.

An option on the Tool menu also allows colours to be picked off a current picture, by positioning the cursor over the relevant pixel. The layout and size of the Palette menu are quite small and it can be dif-

ficult to select just the colour you want. I think a more logical display such as colour scales would have been easier to use. Some indication of what colour you have selected would also be useful on the palette. The chosen colour is shown on the main menu, although it can be difficult to match it on the palette.

Having the tool submenu (like the other submenus) permanently on screen to facilitate tool selection can lead to a rather cluttered desktop, especially if you have other applications running concurrently. A 'stack' option is provided from the icon bar that clears all submenus and stacks all picture windows on top of each other.

The additional submenus provide control over the other features of *Revelation*. The Mark option acts as a brush-size selector – seven fixed sizes of squares and circles are available, plus three user-definable rectangles and ellipses. Choosing a brush size from the mark submenu effects all the drawing tools, ie, brush, pencil and pen.

Other submenus have a similar 'over-all' effect: selecting red from the colour submenu makes all drawing actions red as one would expect. The real strength of *Revelation* lies in the fact that you can combine selections from submenus to create 'macro-tools'. However, there are several rather important features absent which are not possible to simulate through 'tool-mixing'.

Apart from that, *Revelation* supports all the tools you'd expect in an art package. A pencil allows you to 'scribble' lines of any thickness from single-pixel to approx 240 pixels width. A spray can allows dots of colour to be applied randomly over an area and these areas can be filled with colour or the current motif with a roller tool.

Straight lines and regular shapes (rectangles and ellipses) can be created with the Pen tool. Any colour or motif can be used and these can be applied in a number of pre-defined dot patterns.

Unfortunately, there is no provision made for curved lines and, more importantly, there is no way of drawing filled triangles. As triangles are a 'primitive' already present in the Archimedes, it seems strange that they should have been left out.

Two types of cutouts are available; scissors, for cutting rectangles, and a knife for making irregular shapes. Although both tools work well, it is impossible to cut a shape that has holes in (ie, if you wanted to make a window). There is no way of creating masks, which would, if present, have solved the problem. It is possible to draw shapes in *Paint* and then import them as motifs, but this is fiddly and also difficult for those with limited memory in their machines.

MOTIFS

As mentioned before, motifs are a main feature of *Revelation*. Using the cross-hair tool, they can be painted on to a picture as if they were brushes. Motifs can also be flipped in horizontal or vertical axis, and/or rotated through 360 degrees, and/or scaled in size.

A special Blend option allows motifs to be mixed with an existing picture, so that what is behind shows through. Different strengths of blend can be used and successive blending causes the motif to be more prominent.

Various effects can be applied to rectangular areas of a picture. Trace allows areas to be converted to black and white outlines. Outline, strangely enough, traces around edges with black – perhaps these should have been the other way around. The final option, Blur, has a kind of 'smudge' effect and works best in 256 colour modes where more in-between shades are available. Three levels are available with each option.

Other processing effects can be implemented by using the Colour Shift box. This works in 256 colour modes and gives overall control of tone, contrast and colour saturation in a picture. Colour pictures can be converted to grey-scales, or black and white images simply by changing the various levels.

The effect of any tool on a picture can be undone by selecting Undo from the main menu. This only works once, as 'undoing' and 'undo' effectively 'does' it again!

As well as those that effect the picture, there are a number of tools that can be used to aid drawing and painting. Any distance or angle can be measured in centimetres, inches, pixels or user-defined units using the Ruler option. All measurements can be made to appear on the main menu if they are applicable to a particular action – for example, measuring can make scaling of motifs more accurate.

All printing is handled by the standard Risc OS printer drivers. No drivers are supplied with *Revelation*, although all Archimedes and A3000 owners will already have *PrinterDM* and *PrinterPS* drivers on their application discs.

CONCLUSION

There are a number of quite important features missing from *Revelation*. There is no Grid option, allowing accurate line placing – although the Measure option goes some way to solving this, it is still awkward to keep referring to co-ordinates.

Line drawings can be imported from *Draw*, *Poster*,



etc, using the *Revelation Extra* application (supplied on the *Revelation* disc). This helps the lack of special line drawing (curves and triangles) tools, but requires *Draw*, *Revelation* and *Extra* to be running concurrently to simplify transfer.

The flood fill options are also rather lacking. There are no dithered fills for smooth shading between colours, or circular fills – useful for highlighting rounded surfaces.

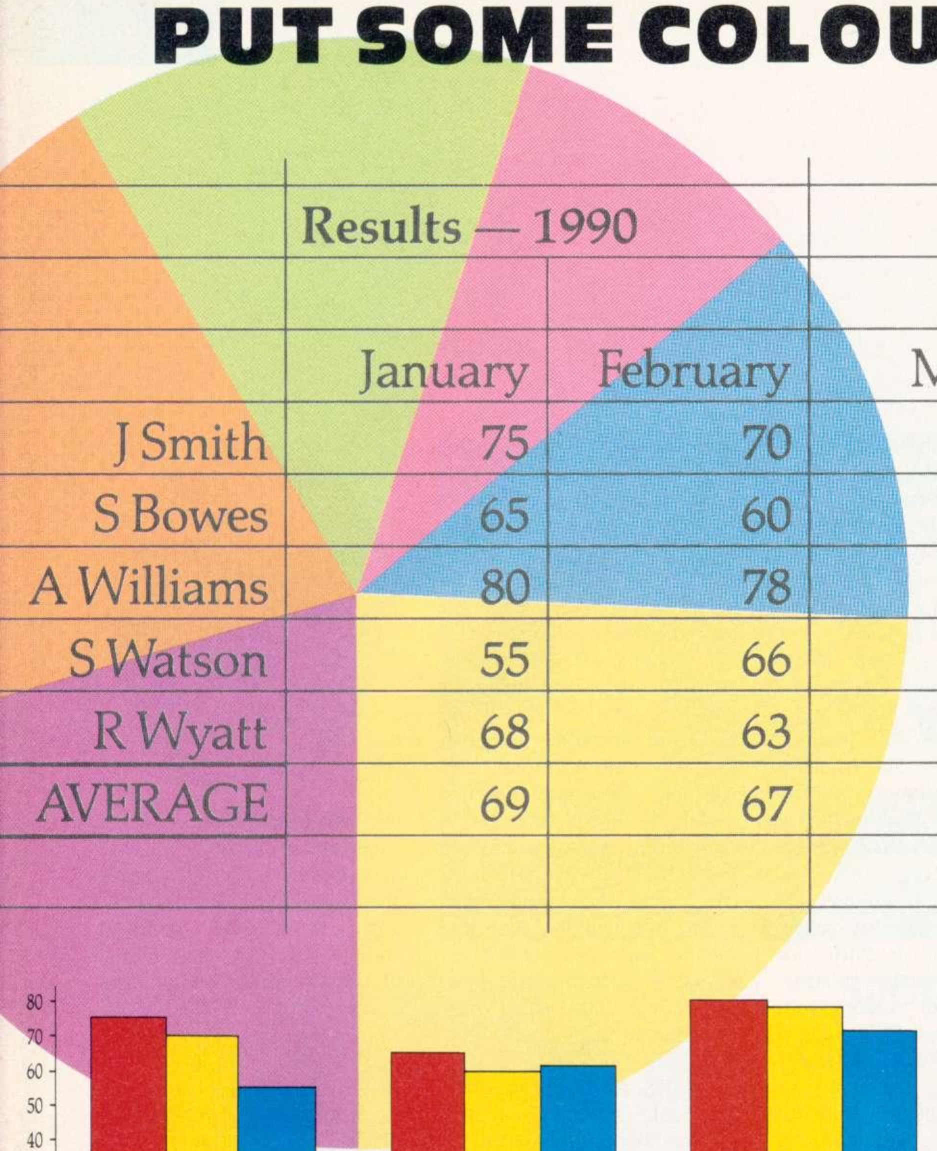
Finally, it is impossible to change mode once you have loaded *Revelation*. Unlike *Paint*, you can not use a lower mode to edit say, a mode 15 picture, without that picture being changed to the new mode. I can't really see why this has been done as it greatly reduces the use of *Revelation* in a computer with small amounts of memory.

Using other Risc OS programs alongside *Revelation* goes some way to solving the program's limitations. But this is only possible if you have a computer with sufficient memory (2Mb plus) and could have been avoided if the extra tools had been implemented.

With a few changes, *Revelation* could become the standard against which all art packages will be judged.

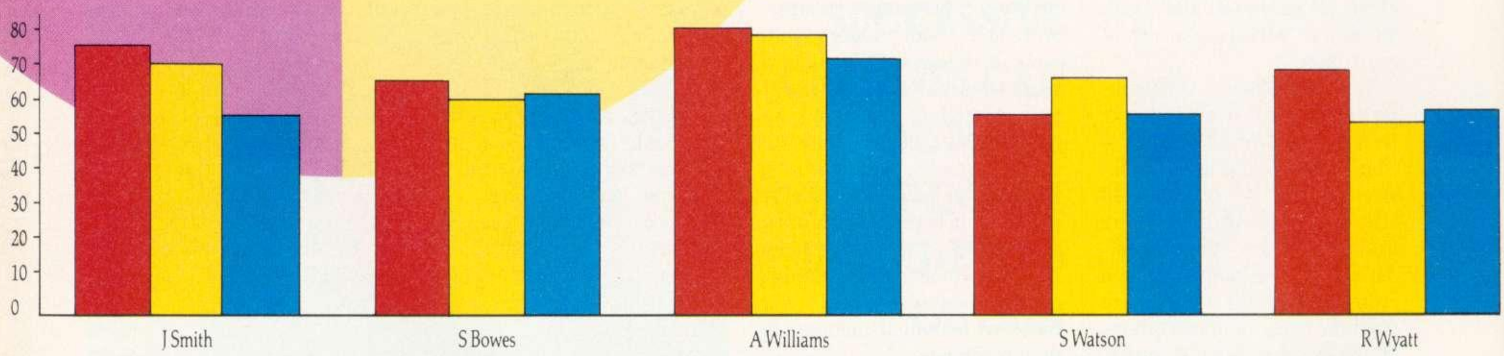
Revelation will cost £65 until March 31, and £90 thereafter, and is available from Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.

PUT SOME COLOUR BACK...



Results — 1990					
	January	February	March		
J Smith	75	70	55		
S Bowes	65	60	61		
A Williams	80	78	71		
S Watson	55	66	55		
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AVERAGE	69	67	60	67	6
				Overall Average	6





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The new version includes nine extra commands which, together with the existing commands, meet the National Curriculum requirements in Mathematics, Technology and English. The new commands include SETPOS to specify an absolute position and HEADING to specify the direction as a compass bearing.

Dart is available for the BBC B/Master and Archimedes/BBC A3000 computers and will control a Jessop floor turtle provided your computer has a User Port. The BBC B/Master version also supports the Valiant turtle and the BBC Buggy. A site licence costs only £25.

To order or for more information, contact:

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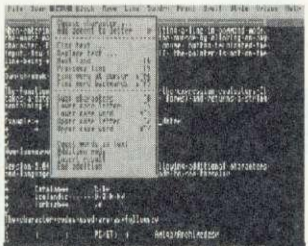
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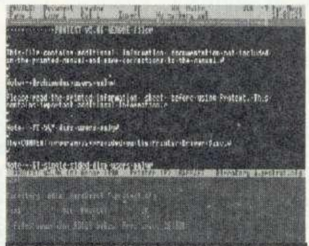
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PROTEXTION RACKET?



MENU CONTROL OF TEXT



PROTEXT COMMAND LINE

Arnor's Protext wordprocessing software is already established in many formats, but how does it take to Risc OS? **SIMON WILLIAMS** investigates

If you want to do wordprocessing on your BBC A3000/Archimedes, the choice is limited to *First Word Plus*, *Pipedream* or one of the older programs running under the BBC 6502 emulator.

Now Arnor's *Protext* wordprocessing package (version 5), which has been available in other formats, is available for the Archimedes.

The package is comprehensive and comes on three discs, with three manuals: a 400-page reference, a slim 50-page tutorial and a pamphlet covering printer drivers.

The manuals cover IBM PC, Atari ST and Commodore Amiga, as well as the Archimedes, versions of the software. However, the program is so similar in each version that the vast bulk of the documentation is common to all.

FLEXIBILITY

Installation is straightforward with the revised routine covering most of the variable elements in the setup. *Protext* is a flexible program, offering facilities to alter just about any aspect of its operation. This can make the extensive configuration menus seem rather daunting. Fortunately, nearly all the defaults are sensible, so you can explore the extra settings as you get to know the program.

Although the program is Risc OS-compatible, and can be launched from the desktop or command line, it doesn't multi-task, or run in a desktop window. Arnor is currently working on a full Risc OS version which will do both.

The main editing screen shows up to 30 lines of text in mode 12, although the program picks up the current screen mode and adjusts its display accordingly. Above the text area are two lines of status information and between these two areas is an optional display of the current ruler. The status lines includes details of word wrap and insert/overwrite settings, the position of the cursor in the document and the document's filename.

The top line of status information doubles up as the menu bar. Pressing f3 or clicking Select shows the menu headings and one of the menus – the menuing system is one of the key additions to version 5. Prior to this version, the program was controlled exclusively by key sequences, which are retained in the current version, but the option of using menu selections as well gives the best of both worlds.

Pressing ESCAPE from edit mode brings up the *Protext* command line over the bottom section of the screen. Most system commands can be passed through from *Protext* to the operating system so, for instance, you can move between drives, call up directories and load and save files from here. In addition, there is an extensive range of wordprocessing commands, unique to *Protext*, which can also be typed from here.

Protext incorporates a command language of its own, controlling much of the word processor's operation. You can print all or sections of text, initiate search and replace or reformat the whole document with a single command. The language can be automated, too, with the use of macros and EXEC files.

Combined with a range of two-character stored commands, which are similar in concept to those used in *Wordwise*, you can tailor the system to your exact needs.

Text is automatically formatted as you type, but only when you move the cursor from one line to another.

Simple text effects like bold, underline and italic are shown in a semi-Wysiwyg style, while others, such as font changes, are displayed as reversed markers in the text.

MOVING TEXT

Block handling is good, using a simple technique of highlighting text with cursor keys or mouse and choosing menu options to move, copy or delete the selected area. You can undelete blocks and count the words in a block or in an entire document.

Find and replace allows for all kinds of unusual searches, including hunting for embedded control codes, index and footnote markers.

Layout options include the usual multi-line headers and footers, but *Protext* also supports footnotes which are automatically attached to markers in the text and move with it if edits shift it from page to page. Also supported are Endnotes, which are similar to footnotes but are queued and printed at the end of the document. Index and table of contents lists can be generated automatically.

Up to 36 documents may be loaded at once, memory permitting, and any two can be displayed on screen. Text can be moved or copied between documents, either between their windows on screen or from one full screen to another. A document may be printed in several columns, though columns aren't shown on screen and are controlled via stored commands embedded in the text.

The spell checker uses a 110,000-word English dictionary plus a memory-based quick dictionary containing 5000 common words, on a named text file or continuously, while text is entered.

Protext comes complete with a well-engineered mailmerge system, again controlled through stored commands.

There are a lot of printer drivers provided with the Protext package, ranging from simple Epson FX80 dot-matrix through inkjets to lasers, although there is no Postscript support yet. You don't have to worry about installing an Acorn driver for printing – the program uses its own.

CONCLUSION

So what are *Protext*'s limitations? Well, apart from not being able to multi-task (a factor which may deter many Arc users), there is no way of displaying graphics on screen, and including them in a document can only be achieved through a stored command to 'include a binary file'. There is no facility for Archimedes font selection, nor to use Acorn print drivers for supported printers – this is strictly a 'printer font only' program. There's no Wysiwyg-style preview to show what a page will really look like.

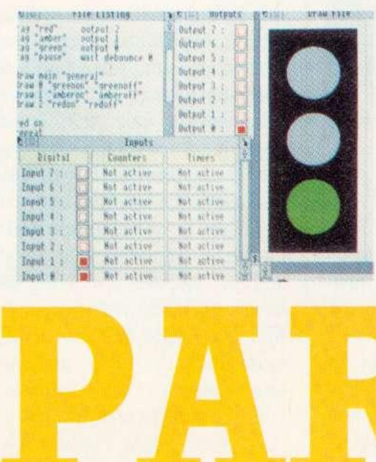
What you do get is a fast, versatile wordprocessor which concentrates on pure and simple wordprocessing.

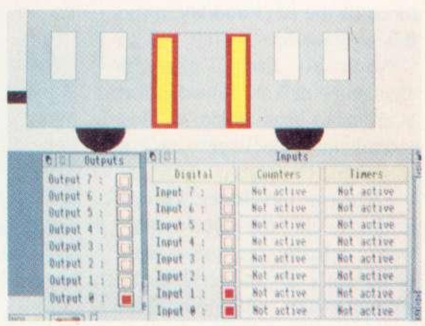
Protext does what it aims to do extremely well. At just under £150, it isn't cheap either. It can be a flexible wordprocessing system – but, of course, you could wait for the multi-tasking version...

Protext 5 costs £149.95 and is available from: Arnor Ltd, 611 Lincoln Road, Peterborough PE1 3HA. Tel: (0733) 68909.

GIVE IT SOME SPARKLE

If you have been looking for an all-purpose control program, then Sparkle might just be it. **CHRIS DRAGE** reports from his classroom





Anyone who visited the Acorn stand at the recent BETT 91 show might have noticed an Alfred Robot Arm performing rather noisily. The software controlling this beast was *Sparkle*, which permits an Archimedes or an A3000 control of input and output devices via an eight-in/eight-out buffer box.

For control applications, an Archimedes A410 will require an Acorn I/O podule, while an A3000 will need a user/analogue port (Morley Electronics or HCCS). An existing buffer box can function with the Arc providing a suitable connecting lead is used (Phobox makes one). If you wish to use the printer for control, Phobox offers a user port expander containing BBC style user/printer sockets.

WHAT IS IT?

Sparkle is a Risc OS compliant, multi-tasking programming environment which aims to '...help teach students of all age groups to be taught the control requirements of the National Curriculum through one medium.' The package comprises a disc and manual and, once loaded, clicking on the *Sparkle* filename places a 'traffic light' icon on the icon bar with a No Sequence label underneath.

The release disc contains numerous example control programs. Dragging a program text file onto the *Sparkle* icon loads a control program whose name now appears. A window immediately opens on the program listing revealing that the *Sparkle* language is, in fact, a version of Control Basic, with all its structures and syntax. However, *Sparkle* does have more to offer.

Programs written in *Edit* are saved to disc along with previously created drawfiles associated with the program. Commands can be included to 'tie' these files to specific outputs so, for example, a traffic light drawfile can appear to 'switch' its lights in sequence. *Sparkle* also allows single *Mogul/Tween* animations and sound samples and music files to be similarly tied, each of which can add considerable interest to the control scenario.

All program control is available from the main menu. Here options include the Deltronics buffer box, Phobox user port expander, analogue inputs and datalogging and there is a module to control an Alfred Robot Arm.

Two windows, for digital inputs and outputs, are both displayed and the latter includes a timer and counter for each of the eight outputs. Clicking on any of these items selects or deselects it, providing an on-screen representation of what is happening with the buffer box.

Arguably, *Sparkle*'s principal attribute lies in its ability to emulate all of its control functions via two control windows and animated graphic representations. For example, train door operation can be made to operate visually on screen as well as on a model. The ability to use drawfiles 'tied' into outputs on the program certainly adds another dimension to teaching control technology. A traffic light sequence can be programmed and tested on-screen before it is put into practice with a model or with miniature LEDs on a buffer box.

CONCLUSION

I have major reservations about the value of *Sparkle* in schools. The National Curriculum emphasises that computer control should form a part of, and extend, other related activities like science, design, problem solving, etc.

The technology now has to come out of the specialist closet and into the classroom, where non-specialist teachers will have to include it in their lessons at some point.

The last thing these teachers (and their pupils!) need is to have to learn to program in Basic.

Similarly, as the National Curriculum concentrates its control statements at key stage 2, Basic is the last thing primary children need. Here Longman Logotron's Archimedes *Control Logo* offers continuity and familiarity.

Will teachers have time to write libraries of meaningful Basic procedures for their pupils to use? Will this approach clarify the control processes? On the secondary front, the way forward is quite clearly via graphical control software: *Control by Design* (Economatics Education Ltd for BBC Master) or *Softlab* (NCET for MS-Dos *Windows 3*) being two recent arrivals. Archimedes versions of these NC-directed programs have yet to materialise.

Similarly, I am not sure whether I want my classroom tied to the Arc for datalogging or control. The BBC B is still the best computer for investigating control technology in the primary and lower-secondary classroom. After all, you really don't need 16 or 32 bits when you are controlling a Lego model.

Perhaps when software in the order of *Softlab* arrives, things will change. Similarly, datalogging is best done with devices like the portable LogIT (Griffin and George), whose logged data can easily be transferred to *Key Plus*.

Despite these criticisms, *Sparkle* offers Archimedes users a powerful control language with the ability to integrate visual and aural stimuli. This package possibly points the way towards the ideal Archimedes control and monitoring environment.

Sparkle is available for the Archimedes and A3000 from: Aietos Software, Bedford Modern School, Manton Lane, Bedford MK41 7TN. The package costs £115.



Once upon a time, Acorn wanted a Risc OS spreadsheet to be produced. Clare's eventually took it on and the result is Schema. **GRAHAM BELL** takes a look at it

FULL SCHEME AHEAD

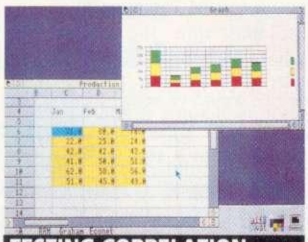
Before the advent of Risc OS, the Archimedes attracted a number of spreadsheet applications – Minerva's *Sigmasheet* and a 3D spreadsheet called *Matrix-3*, for example – however, only the *Pipedream* package from Colton Software made the transition to the new operating system.

The *DTOSheet* element of Minerva's *Desktop Office* suite has fulfilled some simple 'home' accounting needs, but the market has lacked a traditional 'full-strength' application which caters for the most demanding use. The lack of such a spreadsheet must have affected the ready acceptance of the Archimedes in the business world.

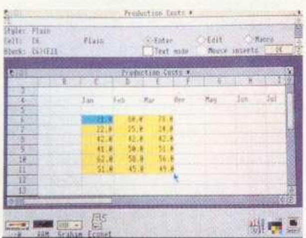
Now, all that is set to change with the introduction of *Schema* from Clare's. This spreadsheet package has a somewhat chequered history.

CRM, a developer known primarily in the QL world, was originally commissioned, by Acorn, to produce a package as part of a complete business software suite – *First Word Plus* had already appeared, and the new application was to be a 'document processor', reputedly similar to what Computer Concepts' *Impression* desktop publishing package has turned out to be.

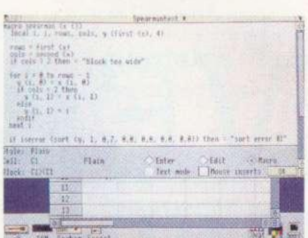
At a later stage, *Schema* was passed to Clares, as Acorn was starting to move away from application software development. Clares completed the project with CRM, with the latter providing *Schema*'s technical support.



TESTING CORRELATION



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GETTING STARTED

Installing *Schema* on the Archimedes is straightforward enough. The installation program helps you configure the program for your machine – it alters *Schema*'s Run file to make it use overlays on a 1Mb machine, for example, and you can choose the colours *Schema* uses on screen to suit your own particular monitor.

To run *Schema* you double click on its icon in the usual way, and it installs itself on the icon bar. Clicking there opens a new blank worksheet window, showing the traditional layout of rows and columns, as well as a separate 'entry window' that you use for typing in new data. The blank worksheet's initial size is set by a parameter in the Run file (you can change it if you wish with the installation program), but you can add any number of new rows and columns.

Clicking on a cell with the mouse and typing a number inserts the number into the cell. You type into the small entry window and pressing RETURN or a cursor key, or clicking the OK button, transfers the number to the cell. To enter text you enclose it in double quotes, or check the text mode Radio button. But this is the first source of frustration – to edit existing text or a number, you select the cell with the mouse, but you can't immediately use the cursor keys and overtype as you would expect – the cursor keys just move the selected cell.

There is a separate Radio button to choose edit mode and yet another for using the mouse to insert cell references into formulae. It's confusing, quite tricky to use, and just one aspect of *Schema*'s slightly untidy 'user interface'.

Another is the 'long click'. You can select both a single cell and a block of many cells, with a single click or a drag of the mouse. But a single-celled block takes a *slo-o-ow* click.

Other basic features of *Schema* are much better. You can fill a whole block of cells with similar formulae in a single operation, and there's a quick way to type in a rectangular block of data (the machine chooses the next cell for you). It's easy to open several separate windows on the same spreadsheet, and there is a commendably wide selection of functions to use in formulae. These can be pasted into a formula in the Edit window from a menu, or typed in directly.

Business users will appreciate the special financial functions like IRR (internal rate of return) and SLN (straight-line depreciation) which make forecasting and financial planning easier. The Gauss function instantly provides 'random' numbers with a Gaussian 'normal' distribution – this could be invaluable in school statistical work.

Schema is speedy, though the absolute speed of recalculation is less important on spreadsheets such as this one, which offers intelligent recalc – redoing only those cells which have changed recently. The raw speed is as much as double that of *Pipedream* for the most used functions.

You can also sort rows or columns of data (numerically or in alphabetical order),

Illustration by Chris Gunson



although the manual is decidedly vague on what happens if you sort cells containing formulae. Loading and saving is like other 'Riscware' – one added twist is that you can give a spreadsheet an internal (logical) name, in addition to its filename.

MACRO LANGUAGE

Schema's trademark – and its greatest strength – is its configurability. This starts simple, with 'user names', but the water gets deeper from there. User names are just constants: they can be numbers like pi, VAT, or k (Boltzmann's constant used in thermodynamics), or they can be names for cells or whole blocks of cells.

The next facet is the macro language. At its simplest, this is a programming language for adding new functions (like Basic's DEF FN). The manual gives the factorial function as an example, but if you want to write a single function to replicate the scoring system of Olympic diving, you can. The top photograph (opposite) shows a macro I created to work out the Spearman Rank Correllation coefficient, a non-parametric statistical test of correlation.

Macros are complete programs – they can implement new functions and draw graphics and the manual claims they run at about one-tenth the speed of BBC Basic. The language confers control over all of *Schema*'s internals, but falls down on externals. Matrix arithmetic is its long suit, but there's no pre-packaged filing for example (like Basic's BPUT# or BGET#).

Another problem is that the intelligent recalc just isn't intelligent enough – it doesn't re-execute a macro if one of the cells it uses changes, so you can't make the graphs 'live' to reflect changes in the data and manual recalculation is required.

PRESENTATION

Schema's other innovation is a system of 'styles'. You can define a style to have any combination of typeface, size, colour and alignment.

The style also controls the display format of numbers and text, and it is vital to realise that each style is in fact four independent styles – for text, positive, zero and negative numbers.

Schema fails to excel in its presentation of graphs and charts. You can easily create a pie, line or bar chart of a row or column of figures, but the results are often a little dull.

Of course, this need not be seen as a problem – simple graphs can carry the message best. But *Schema* does have to compete with Minerva's *Graphbox* and Lingenuity's *Presenter* and both offer 3D effects and sport a wider range of chart types.

A lot can be done with *Schema*'s charts, but this is not immediately apparent. Labels follow the spreadsheet styles, so you can control size and typeface (more than can be said for *Presenter* and *Graphbox*) and graphs can be saved as drawfiles.

Aside from designing new functions, the main use for the macro language is for improving the graphics – you can add features to the existing types of charts, or create completely new displays.

FILING

Schema's many Load and Save options are of admirable flexibility. First you can hold several spreadsheets in memory at once, and you can refer to cells in more than one spreadsheet for things like reconciliations and summaries.

When you have saved all the spreadsheets, a single 'workspace' file will remember all their details and allow you to recall all the sheets as they were, in a single operation. You can also file particular parts of a sheet, and transfer a section of one sheet into another.

Whole sheets can be saved in *Schema*'s own file format, or as a CSV or TSV file suitable for importing into other applications, or as plain text.

There's also a nifty import utility to translate *Lotus 123* files from the PC, which defines almost every Lotus function without a *Schema* equivalent via a macro. This macro file is instructive for anyone beginning to write their own macros too. But there is no *Viewsheet* converter to ease migration from the Beeb – this could prove to be a serious omission for many potential buyers.

CONCLUSION

Schema comes with the latest Acorn printer drivers (see box), and makes use of the new facilities by trying to reflect the styles on the sheet even in 'draft' (plain text) print mode. If the style says bold, it prints bold. The sheet can be printed with or without the grid of lines, all or part of the sheet can be printed, and large sheets are tiled sensibly over more than one sheet.

Schema is a very welcome addition to the software base for Risc OS, which for too long has lacked a full-strength traditional spreadsheet. It is a little tricky and inconsistent in some areas, but is capable and reliable, and more than a match for the spreadsheet element of *Pipedream*.

Schema costs £130. Further information is available from: Clares Micro Supplies, 98 Middlewich Road, Rudheath, Cheshire CW9 7DA.

COMPARISIONS

● The flavour of Schema is much like that of the archetypal Wimp spreadsheet, Excel, on the Macintosh or under Windows on the PC. It lacks some of the polish of that application, but gains in several significant areas – particularly the macro language and the multi-tasking.

Compared to the other main Mac spreadsheet Wingz, Schema lacks sophistication in the graphing options. Wingz has a number of trendy-looking 3D graph options built-in, whereas Schema is 2D and rather dull-looking. This may be a blessing in disguise – those 3D graphs are notoriously hard to interpret.

Wingz' language is considerably more capable too. The main use for the Schema macro language will be to beef up the graphics and to add new functions for specialist uses. Someone will no doubt create a set of Schema macros to draw those 3D charts. What you cannot do is radically alter the look and workings of Schema itself – which you can with Wingz.

PRINTER DRIVERS

● Schema is provided with a new set of printer drivers for Postscript, Laserjet, Integrex and generic dot-matrix printers. These replace the set supplied with the welcome discs. The new drivers are also available separately, from SID (see the Customer Hotline column on page 27) or Acorn Direct.

The graphics printing (including text using the outline typefaces) is not changed significantly from the originals, but text printing is improved. Essentially, plain text files (such as those written with Edit) can now contain codes for italic, bold, underline and so on. The codes are a subset of those used by First Word Plus.

Schema already makes use of the new printer drivers when printing in draft mode – the printout follows your spreadsheet styles as much as possible, showing any bold text and so on. Other software should also benefit in the future – in particular character-based wordprocessors like Minerva's Easiword, Pipedream and First Word Plus itself – but this will require upgrades to the applications.

ARCHWAY TO SUCCESS

Daunted by the prospect of writing your own applications on the Arc? Then Simtron's Archway could open a few windows to programming success, as **DAVID ACTON** found out



If you've never written a desktop application on the Archimedes, the prospect can seem quite daunting.

The programming required can be complicated – to put a simple graphics demo in a desktop window often requires more lines of Basic than the original program!

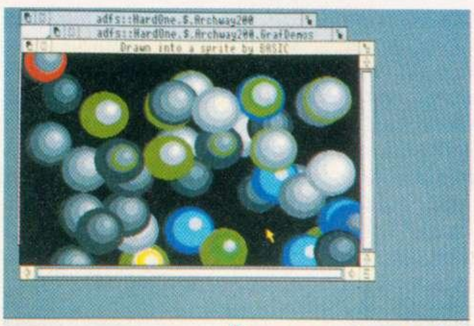
There has long been a need for an environment in which the creation of desktop applications in Basic is made much simpler. *Archway 2* from Simtron has clearly been designed to fill this gap.

The program has been a long time coming, evidently due to the considerable work that has gone into its creation. *Archway* is really a collection of editors that allow you to create and edit all the components of an application. Some are links to standard applications – for example, there is an icon-bar version of the Basic editor which allows you to nip out of the desktop, edit your main application program and jump back in again. Most are full-blown editors in their own right.

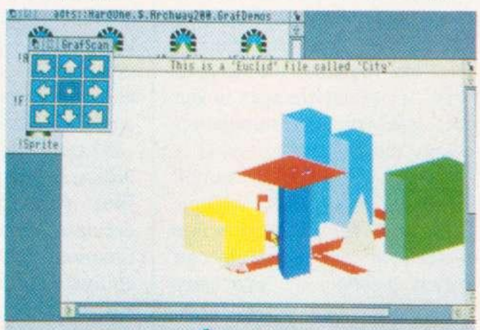
Many people advocate the use of shells when writing Basic applications.

This involves taking a program that just has the bare bones needed to stand up in the desktop world and adding the 'flesh'.

This has the disadvantage that the 'shell' often contains very little of use because it has to suit all purposes. *Archway* gets around this problem very well by providing a variety of shells, eg, for graphics, database-type programs, and editors. Having chosen your shell, your application can be created with default menus, windows, etc.



DRAWING IN A SPRITE FROM BASIC



DISPLAYING A EUCLID FILE

Illustration by Bruce Ingman

MENUS

Menus are nearly always pretty tricky to deal with. A Basic programmer will generally work out a way of doing things and stick to it!

Archway's menu editor makes it easy to create new menus and add to, or alter, the items on them. You can tell *Archway* to call a Basic function in your main program should a particular menu item be selected, and this really does take a lot of the effort out of programming.

The usual way to define windows for a desktop application is to use *FormEd,* the Acorn template editor. *Archway* applications do not use template files – instead, your application has within it a Windows file and the contents of this may be edited by not one, but several, editors.

As someone who is used to *FormEd*, I found the *Archway* tools a little odd at first, although they seem to provide all the same facilities, and more besides.

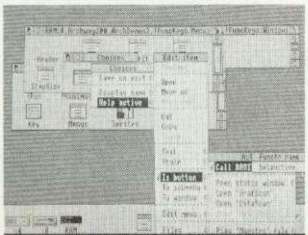
For example, it is possible to give a window a 'background' that can be anything from a sprite to a 3D (*Euclid*) image. All the work of rendering such pictures is done by the *Archway* libraries, which are 'overlayed' onto your own Basic program when the application is run.

One of the key advantages of writing your applications within *Archway* is the 'linking' of visual entities, such as menus and icons, to the program itself. For example, when designing windows and icons in the normal way, *FormEd* has no idea about what program will be using those windows. The *Archway* editors do provide a means of tying everything together – you can link an icon to a piece of Basic just as you can link a menu item to a Basic function.

Icons can also be set up to have other effects when pressed. Some are useful (like



ANIMATION IN PROGRESS



EDITING A MENU

opening a window) and others merely bizarre. There is an option on the Frame icon action menu that allows you to play a *Maestro* file when the icon is pressed – a quaint facility that would be handy when writing a *Hypercard*-like program, but you would not expect it to have its own menu.

Examples are very important when learning to program in any environment and, as far as the desktop goes, they are absolutely vital. *Archway* includes a large collection of examples and, to complement them, 'sessions' are included in the manual which detail how the demonstrations were created from the shells.

BASIC FAMILIARITY

My guess is that readers who might be interested in *Archway* will already be able to program fairly well in Basic, but haven't yet taken the plunge and put their work in a window. Some of the examples provided illustrate that using *Archway* may be the best approach.

For example, a demo called *Sprite* opens up a window containing a picture drawn by a Basic program. The lines of Basic that draw the scene could easily have been written outside the desktop and 'dropped in', with the work of handling windows, 'writing to a sprite', and so on, being taken care of for you.

Many other possibilities seem to be available with *Archway* and other examples illustrate animation within an icon (or 'frame'), creating a simple database and playing music. I am also pleased to see that the editors are themselves written as *Archway* applications, demonstrating the author's faith in the product and proving that 'real' applications can be created (too many programming tools are useful only for writing demos of programming tools).

For your money, you get a chunky 300-odd page manual and four (cutely colour-coded) discs, the contents of which are easily transferable to a hard disc using the comprehensive instructions provided. In fact, the size of the manual disguises the true scale of this product. Many tutorials (12,000 words or so) are provided on the discs, continuing where the manual leaves off. There is also a technical reference directory containing libraries of handy Basic functions, descriptions of how to use them and other useful information.

One of the few criticisms I have is the manual's index. I looked up 'heap', for example (heaps being an important constituent of desktop programming), only to find the word wasn't listed. Once familiar with the *Archway* functions, you would know to look up FNgh() (meaning 'get heap'). But because this and many of the standard library functions have rather obscure names, it is hard for the user to track down the required snippet of information. There is a directory called Techref which contains descriptions of the library functions, but this is not mentioned in the index.

However you design your applications, you will need to become familiar with a lot of standard calls and ways of doing things. I am sure *Archway* will cut out a lot of the work of writing simple applications for many people. As for larger projects, they take a good deal of time to produce anyway, so getting used to some of the oddly-named *Archway* functions is no harder than familiarising yourself with the ins and outs of doing it yourself.

CONCLUSION

As someone who has survived without an environment like *Archway* for some time, I may be a bit long-in-the-tooth to change now. Even so, some of the facilities are very tempting and could prove time-saving. If you are new to the desktop, I think this could be a very good place to start.

Ultimately there is no substitute for writing your own code, but I can say from experience that it takes a long time to get the hang of the Wimp environment, and it often takes surprisingly large amounts of programming to do seemingly simple things.

Archway provides a quicker means of getting results and could be an excellent way for many to begin.

I hope that it will give more credibility to Basic applications. Acorn recommends 'C' as the language in which to write desktop programs, but many excellent applications, such as *Maestro*, show that Basic is a sound alternative (excuse the pun). Simtron has wisely allowed the necessary bits and pieces to be distributed along with your own code, so we might see some 'Archware' in the near future.

Archway 2 costs £99.95, but owners of version 1 can obtain a free upgrade. Contact Simon Wright, Simtron, 4 Clarence Drive, East Grinstead, West Sussex RH19 4RZ. Tel: (0342) 328188.

5 GOOD

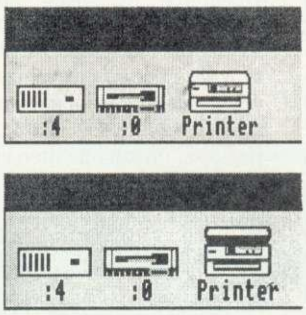
FOR CHOOSING

The most advanced printing technology available for the Archimedes. The productivity gains from the LaserDirect are achievable from no other type of printer direct drive or otherwise. Not only does LaserDirect save money because of its low cost, it also saves money because it saves time.

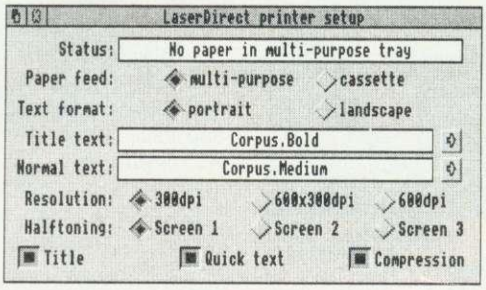
5 reasons why LaserDirect printers have become the most popular laser printer for the Archimedes.

1. *Direct Drive*

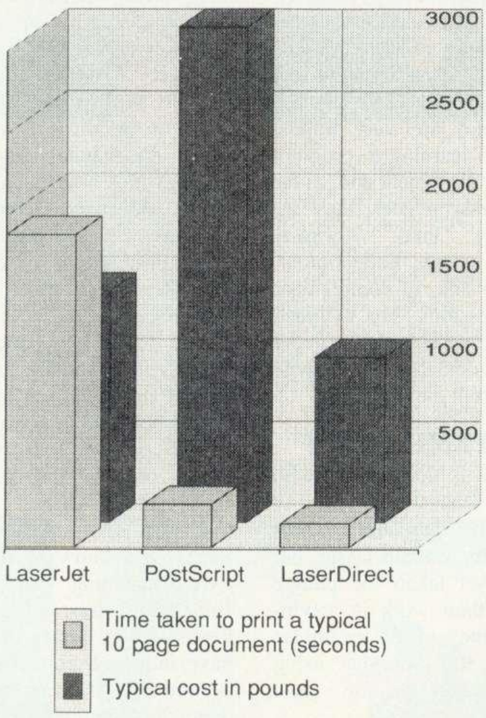
The LaserDirect printer consists of a single expansion board that fits inside the Archimedes connected to a special version of a liquid crystal print mechanism or a laser print engine, all driven by some advanced printer driver software. By omitting the electronics from the laser printer and allowing the Archimedes to control the laser and printer mechanism directly, the LaserDirect system is cheaper, faster and more flexible than traditional printers. By avoiding the bottleneck of the serial or parallel port, data can be transferred up to 200 times faster. By having a bi-directional data transfer the printer returns useful information back to the computer, so the software knows when the printer is out of paper or toner, or when the lid is open.



Open the lid of the printer, and the printer icon reflects this operation



Status shows feedback from printer. This diagram also shows resolution settings (for LaserDirect HiRes only).



Laser-Direct has a lower cost and shorter print times than other laser printers

Since the ARM processor is much faster than the typical processor contained in the printer, it is able to build up the printer image far faster than traditional printers. Also, because the Archimedes performs the picture and text rendering, it can use the Acorn outline fonts and graphic facilities to guarantee absolute RISC OS compatibility if you have a font on screen then you can be sure it will print.

2. *Fast Text**

The normal Acorn text printing routines are not optimised for the high resolution monochrome printing. With the LaserDirect, special optimised text printing routines have been provided that can double or triple the speed of printing outline font text. Since these routines can render the text directly at a 90 degree angle, it also means that printing sideways can be faster still.

3. *Page Queueing**

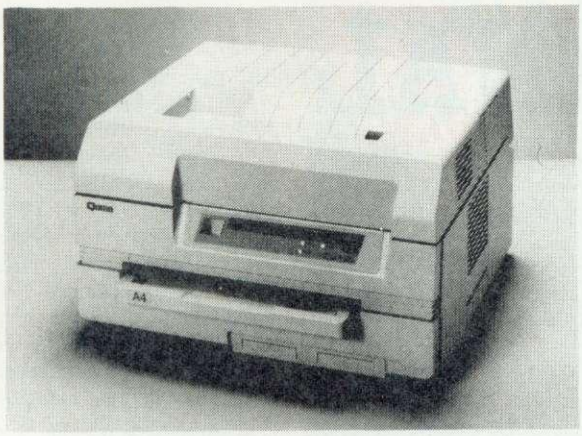
The software creates pages, so fast that in many cases the printer can't keep up. Therefore the LaserDirect printer driver allows the pages to be stored in a queue so that they are ready as soon as the printer has output the previous page. For pages of text this typically means the printer can print as fast as it can get pages through the mechanism- 6 pages per minute with the standard LaserDirect, 8 pages per minute for LaserDirect Hi Res.

4. *Background Printing**

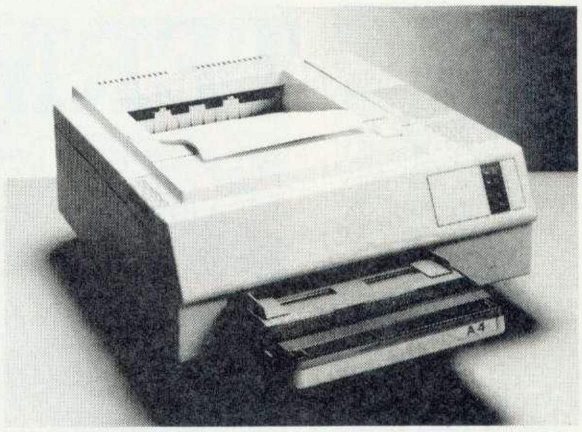
In conjunction with the page queue, the LaserDirect software allows background printng. This has several significant advantages. Not only can the printer be reading pages from the queue while the computer is used for other purposes, it also allows subsequent pages of a multi-page document to be rendered while earlier pages are being output. It also means that printing multiple copies of a page occupies the computer for no longer than it takes to print one copy.

REASONS

LASER DIRECT



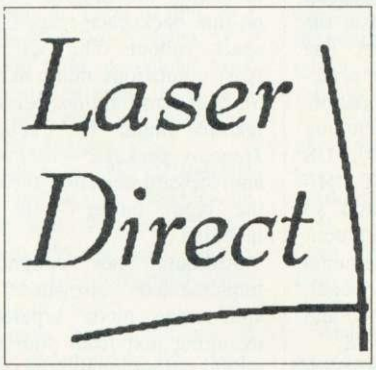
LaserDirect



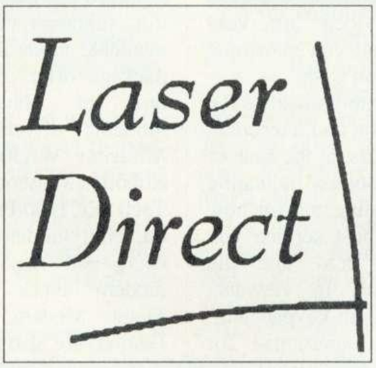
LaserDirect Hi Res

5. *High Resolution**

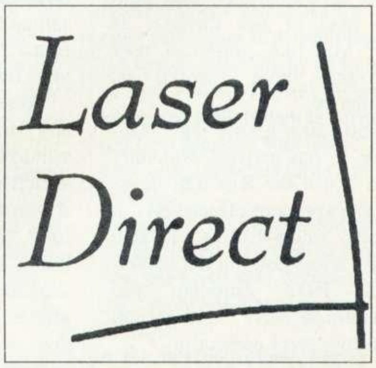
The laserDirect Hi Res has the additional capability to control the printer dot size and position to a much higher degree of accuracy than normal 300 dpi printers. The software offers three resolutions from 300 by 300 dpi to 600 by 600 dpi. At the higher resolutions the jaggies that can sometimes be seen with 300 dpi printers are all but eliminated, giving far smoother curves and italic text - ideal for the more professional applications.



300 x 300 magnified by 300%



300 x 600 magnified by 300%



600 x 600 magnified by 300%

NEW IMPROVED SOFTWARE FOR NETWORKS

New driver software for network use will soon be available allowing fast printing (from non RISC OS applications such as BASIC, FirstWord Plus and Inter Word) and full page graphics printing over the network (Econet and SJ Nexus) using our optional PostScript compatible interpreter. Contact Computer Concepts for further details.

LaserDirect £999 + VAT
LaserDirect Hi Res £1495 + VAT

Computer Concepts Ltd
Gaddesden Place,
Hemel Hempstead, Herts.HP2 6EX
Tel. 0442 63933

**All features marked with an asterisk are unique to LaserDirect printers and are not available on any other printer, direct drive or otherwise.*

WAITING AT THE TERMINAL

Arc users have been patiently waiting for a Risc OS-friendly comms package. Now, at last, it is here, in the form of ArcTerm 7. IAN BURLEY goes on-line to check it out

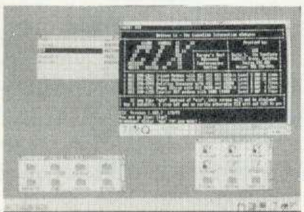
Two years ago I reviewed the *ArcTerm* 6.01 communications package from Somerset-based company, The Serial Port. The package was pre-Risc OS and, to date, the comms world has not fully benefitted from the Risc OS desktop environment, with the exception of *ArcComm*, originally from BBC Soft and now being marketed by Longman Logotron.

Unfortunately, *ArcComm*, although excellent value at just £29.95, does not feature screen sharing with other applications and, where it counts, only sports a rather modest specification. The most popular Archimedes comms package has been *Hearsay* from Beebug. Although not originally written for Risc OS, *Hearsay*'s good specifications, and general ease of use through its own Mac-like graphical user interface, have ensured its popularity.

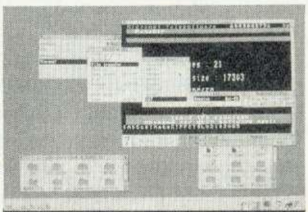
Now, after a long wait, *ArcTerm 7* has arrived. Not only does it use the Risc OS desktop environment effectively, it is also multi-tasking. It also sports a top-ranking list of features, from Zmodem file transfers to MNP2 and Prestel Vasscom error correction.

USING ARCTERM

ArcTerm installs itself on the icon bar after double clicking on its application icon. The software is not copy protected, but your backup must sport one of the supplied disc backup labels. Hugo Fiennes, *ArcTerm*'s author, is a bit of an Archimedes sound/music-sample guru and his sense of humour has been put to good use here. It is possible to configure the program to play various samples as audible indicators – for example, when an on-line connection is made, when a file transfer has finished or even to tell you when *ArcTerm* has been run. The samples provided are very funny, but you can substitute your own if you wish.



RISC OS ARCTERM...



...FOR THE SERIOUS USER

To start, simply click on the *ArcTerm 7* icon and a terminal window appears, at the base of which is a toolbox indicating if you are on-line and for how long, which host service you have logged onto, and file transfer status. In viewdata mode, a numeric keypad window can be summoned for keyboard-less control.

The first menu option is for Configuration, used to set fundamental parameters like modem speeds, the data word format and flow control options. A Link-level option offers either MNP level 2 or Prestel Vasscom line noise error correction – the former is unusual in a comms terminal and very welcome if you don't have a modem featuring MNP.

Both MNP and Vasscom receive and transmit data in blocks, which can lead to some jerkiness on screen. To smooth this out, though, there is a Trickle option.

Also from the Configure menu is a Modem configuration submenu which lists the available modem drivers. The package offers a good selection of Hayes-compatible modem drivers, including Miracom WS3000/4000, US Robotics/Miracom HST, Hi-Tech EC2400/Pro-4, and so on. Null modem (direct connect) and less conventional modem types (eg,Voyager, Magic Modem, Apollo and Demon) are also supported.

Incidentally, *ArcTerm* supports more than one serial port modem connection through the Intelligent Interfaces dual RS423 podule which, when fitted, allows two modems and two versions of *ArcTerm* to run at the same time. Modem drivers are written in 7Script, *ArcTerm 7*'s own programming language. More about this later.

The next menu option is Terminal emulation. All the conventional scrolling access terminals are supported, including TTY or teletype, VT52, VT102 and Ansi. Viewdata is supported, but excluded are Minitel (CEPT Profile 2) and Bildschirmtex (CEPT Profile 1). There is also a BBC mode 7 screen emulator for BBC bulletin boards.

Finally, there is a Campus 2000 option. This automatically toggles between viewdata and VT102 scrolling under control of the TTNS/Campus 2000 host system. Some of the terminal options have further submenus, for example the Viewdata menu enables # and RETURN key swapping, numeric keypad window selection, auto-reply mailbox routing and the selection of a special screen mode for multisync monitors.

TERMINAL MODES

I have a few small grumbles about the scrolling terminal modes. Unlike some of the competition, there is no option to enable the DELETE key to on-line backspace-space-backspace rubout. The VT and Ansi emulations don't have a Smooth scroll option. A useful feature found in Beebug's *Hearsay* package – backward and forward scrolling through the input buffer – is not included.

Although not commonly implemented elsewhere, a split-screen mode separating incoming text from your outgoing typing would be ideal for user-user chatting and multi-user game playing.

ArcTerm uses a caret rather than a conventional underline or block cursor, although options for the latter would have been useful.

Grumbles aside, the scrolling terminals, especially Ansi with its colour and graphics, work well. There is a useful text cut and paste facility and icons can be dragged around for uploading or downloading.

As long as you have flow control you can even do other things, such as format discs, while a file transfer is taking place. To be able to do things like this is a world away from



the old non-Risc OS packages.

On the viewdata side, it's a real shame the superb graphics are not complemented by a frame/mailbox editor. To make matters worse, although you can save frames in either *ArcComm* or *Hearsay*, framestore compatible files, you cannot redisplay them without those programs being present.

Once again, the caret isn't very suitable as an alternative to a block cursor in viewdata mode. But this is more than off-set by *ArcTerm*'s assets, which include brilliant viewdata graphics and text emulation, a smart telesoftware downloader and the sheer convenience and elegance of everything multi-tasking.

To demonstrate the potential of 7Script, the package's programming language, you can program *ArcTerm* to dial up a selected on-line service at a specific time, download your mail, upload some more and log off with a relatively modest program.

There is nothing to stop you from writing your own bulletin board with 7Script. All the modem drivers and various bits of *ArcTerm* itself were written in 7Script.

Comms script languages are quite common in the IBM-compatible world, but only *ArcComm* offers an alternative to 7Script for the Archimedes. *ArcComm* script isn't as powerful as 7Script, but you can even convert files to 7Script. Programmers will love it.

CONCLUSION

ArcTerm 7 is a great comms package, even when compared with the best from other computers. It builds on the strengths of the old package and adds the user-friendliness of Risc OS.

The selection of terminal emulations is generous, as is the list of file transfer protocols. The viewdata emulation is simply the best I've ever seen.

However, *ArcTerm* can be improved. The dial store window can be confusing at times – it doesn't always dial the number you thought had been selected, the viewdata terminal desperately needs a mailbox editor and a few details need tidying up.

Nevertheless, the manual is excellent and once you're used to it, the *ArcTerm* system works very well indeed.

It is pricey at £79.95, but it does represent mostly how comms should be applied on the Archimedes.

At present there simply isn't any Risc OS-based comms competition, but that won't be the case for long. *ArcComm 2* is due shortly from Longman Logotron, but while this will be truly Risc OS multi-tasking, it is unlikely to match *ArcTerm* for facilities (unless you need CEPT Profiles 2 and 3). *Hearsay* is also in the process of being converted to Risc OS and this could give *ArcTerm* a good run. But, for now, *ArcTerm* is the serious user's choice.

ArcTerm 7 costs £79.95 and is available from The Serial Port, Burcott Manor, Wells, Somerset BA5 1NH. Tel: (0243) 531194.

FEATURE COMPARISON

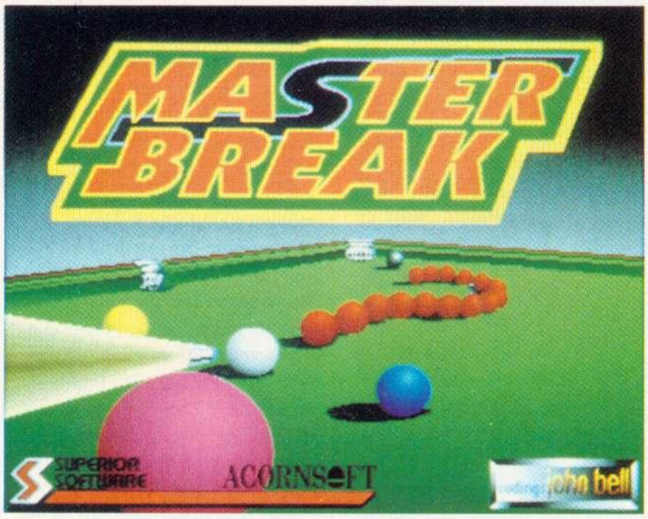
	Arcterm7	ArcComm	Hearsay
Price	£79.95	£29.95	£59.95
Risc OS windows	Yes	Adapted	No
Multi-tasking	Yes	No	No
Script language	Yes	Yes	No
Host mode	Yes	No	No
MNP2 error correction	Yes	No	No
Prestel Vasscom error correction	Yes	Yes	Yes
Viewdata editor	No	Yes	Yes
Sliding input buffer window	No	No	Yes
Zmodem file transfer	Yes	No	No
CEPT Profile 1 (Bildschirmtex)	No	Yes	No
CEPT Profile 2 (Minitel)	No	Yes	No

JARGON BUSTER

- Hayes AT command set: The modem command set upon which most intelligent modems available to personal computer users are based. Originally developed by US modem manufacturer, Hayes.
- Viewdata: The colourful Teletext-like alpha-mosaic and frame-based videotex comms display standard used by Prestel and other similar information systems. Also referred to as CEPT Profile 3; Profile 1 and 2 also exist in Europe.
- XModem: Perhaps the most commonly used error corrected file transfer protocol. If line noise causes data corruption, part of the transfer is repeated until it's corruption free.
- MNP: Microcom Networking Protocol; a series of error correction and data compression standards usually incorporated in better modems. Eliminates line noise and higher MNP levels (eg.5) can speed up the link by up to 100 percent. You need to be connected to another MNP system to benefit. ARCterm supports MNP level 2, a basic error correction facility, in software.
- Vasscom: The error correction standard used on Prestel to eliminate line noise. Also the name of the nationwide Prestel access network.
- Minitel: The videotex display standard pioneered in France; an enhancement of Prestel viewdata with higher resolution raphics and more colours. Also referred to as CEPT Profile 2.
- Bildschirmtex: The next stage on from Minitel; it has more colours and an even higher resolution. It is commonly used in Germany and is officially the European Videotex standard for the future. CEPT Profile 1.
- Scrolling terminal: Examples: Teletype, VT52, VT100, ANSI. Unlike frame-based videotex terminals which clear the screen after a page of information has been displayed, scrolling terminals continuously scroll the screen as more information is received.

GAMES

GAME SHOW



Spring is usually a quiet time on the games front and most companies are still recovering from the rigours of last Christmas while preparing games for the next one.

The Fourth Dimension refused to reveal anything specific about this year's plans, other than to comment: 'You think of any type of game and we've probably got one in the pipeline'.

Mike Fowler of Cambridge International Software has told me about a series of simulators the company is preparing. The first, *Microdrive*, was released a few months ago and broke new ground by having the user control the golfer's limbs, rather than the golf club. The next game will be a Formula One racing car simulator, similar to *Powerband*, except that the player gets a driver's eye view (as in *Revs*), plus proper mirrors, hills and chicanes.

Chequered Flag is being called a real simulator, while the Fourth Dimension-labelled *Powerband* is a mere 'pseudo-sim'! I think we'll hav e to get our Formula One racing expert Andreas (see *Powerband* review) to give *Flag* the once-over when it is released at the beginning of March. The next simulator after this will be a motorbike game, and anybody who buys *Chequered Flag* will get a £5 discount.

Sam Greenhill



Master Break is a trivia game with a difference

MASTER BREAK

Superior Software. Tel: (0652) 58585. BBC/Electron cassette £9.95, BBC disc £11.95, Compact £14.95, Archimedes £19.95.

'Which British ex-PM made a mercy flight to Iraq in 1990?' asks the computer and a quick response from my deft fingers pots a red ball.

My reward? 'What is the capital of Saudi Arabia?' *Master Break* is a new game with new questions. So what's that got to do with snooker? Well, *Master Break* is a trivia game with a difference.

To explain, take this analogy (and please forgive my vivid imagination). Imagine you are playing a game of snooker doubles with Stephen Hendry as your partner. Now you and Stephen have a neat little system going along the lines of brains versus brawn, whereby Hendry handles the snooker side of things and you sit in the *Mastermind* chair.

Now imagine a computer takes input from you and sends output to Stephen's 'balls' via a large electricity generator. The computer asks you a question which, if you get it right, offers no problem – Stephen pots the ball. Get it wrong and he is distracted by 10,000 volts and misses the shot. None of this is graphically represented in the game – I'm just trying to explain it to you! More simply – get the right answer and you pot something, get it wrong and you don't!

A successfully answered red question leads to a colour question. If you choose yellow the clock ticks relatively slowly, but with the black question you hardly have a chance to read the four choices before having to whack a key (or click a mouse button on the Archimedes).

Once all the red balls have been potted you move onto the colours with yellow through to black. It's a simple concept and quite effective. The questions themselves are grouped into the same subjects as in *Trivial Pursuit*, but the difference is that you have little say

in which topic your fate lies – this is chosen at random.

My friends kept getting easy science questions while I was asked about Russian farmers. There are supposed to be over 1500 questions in the BBC version, but I was asked the same question twice on at least seven occasions. The Arc version doesn't have this problem, and it does have digitised graphics questions (of John Major!) and sampled music.

I'm sure the response mechanism in both versions could be improved, though I'm not sure how. Also, the game time is limited to just one frame which can be over in five minutes. Apart from these moans, *Master Break* isn't bad. If you like trivia games, then you could do worse.

Sam Greenhill



POWERBAND

The Fourth Dimension. Tel: (0742) 700661. Archimedes £24.95.

Powerband is a new racing car Formula One pseudo-simulator from The Fourth Dimension. The combined game and simulator is best described as a cross between *Revs* and *Pole Position*, and the pseudo-simulator aspect is really where *Powerband*'s problems lie.

In *Revs,* you have the impression that you're actually in the car, face to face with a steering wheel and a nice large circular rev counter, which can be read at a glance, ahead of which are a pair of tyres.

In *Powerband*, you view the back end of your car from the outside as if you were standing behind it. Not a good start. The car's vital display functions consist of a rev counter (unreadable), speedometer (in a Formula One car?) a gear indicator, position and lap indicators and finally a stopwatch read-out for your fastest and last lap times.

All this information and more, including oil temperature, are displayed in a little box in the left-hand bottom corner of the screen. I am sure that this is not what Nigel Mansell sees when he looks at the instrumentation of his car.

Luckily, setting up the car is easier than trying to read the rev counter. The garage is by far the best feature of the game. The variables you can play with are – the aerofoil settings in degrees (the higher the number the greater the downforce); the engine power output; the type of gearbox; the steering ratio (the number of turns of the steering wheel required to achieve full lock); and finally, you can choose between three different types of tyre for your car.

Once you have sorted out the car you can decide if you would like some practice in Fun mode, make your startling debut in a race, or if you're a real nutter make a world championship challenge. By clicking into Airport mode you can choose whether you want to spin off at Estoril (Portugal), or set a fastest lap time at Wellington.

My favourite feature is the facility for changing the skill levels of the other drivers. This can be achieved while you are on the main options screen by moving the pointer onto a rotating car and clicking the left or right button.

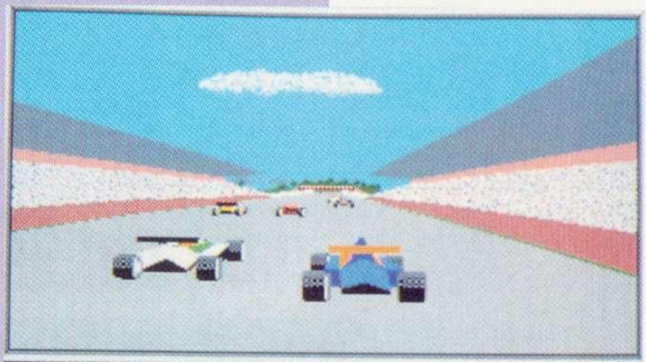
There are two ways to look at *Powerband*'s game play. As a racing game it's not bad for both beginner and expert. It's like *Pole Position,* but more realistic. Unfortunately as a simulator it doesn't come up to scratch. It creates nowhere near the same adrenalin pumping illusion of reality that *Revs* possesses.

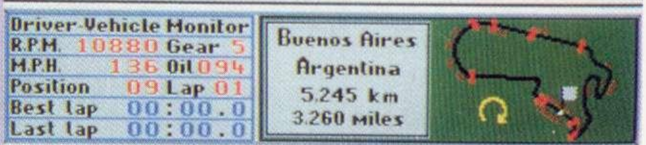
The way the car behaves on the track is total fiction. The representation of Understeer and Oversteer is obscure – you can't tell how the car is behaving. As far as sound effects go, they are not very good: the tyre screeching can only be compared to a sealion with a hot chip in its mouth.

I know it sounds far-fetched, but in *Revs* you can actually perceive what the car is doing just through listening.

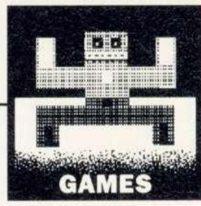
However, *Powerband* is easier to play than *Revs* and hence some people will prefer it, but any driving enthusiast will not give it a second look. *Powerband* is a very good idea, badly executed, and not quite worth £25.

Andreas Engelzou





As a racing game, Powerband isn't bad. However, as a simulation it's disappointing



CRISIS

Cambridge International Software. Tel: 071-833 4023. Archimedes £18.

Crisis is a game about the brain. Some horrible black tumours have invaded the grey matter between your ears and, if left to their own devices, will turn you into a permanently weird being destined to play strange computer games for the rest of your life (what's weird about that?).

The game itself could be anything. The small spherical character under your control is definitely an eyeball, and the pulsing 'things' which haunt the colourful maze of your head are definitely brains. Fine. But what on earth has Bruce Forsyth and the Mona Lisa got to do with my brain?

Brucie zips about and looks like a guy with a nervous itch in his neck. The Mona Lisa roams around mysteriously, but both can be destroyed with a burst of psychic energy in their general direction. It can't work over television, though – I've been trying to destroy old Forsyth for years.

The tumours create mutants (maybe they created Bruce?) which patrol the maze and can only be shot when you're facing them. The maze itself is viewed from above, and consists of colourful blocks. A nice feature is the parallax effect as you move about, unfortunately the highly flickery scrolling routines spoil it.

There are six levels (or 'senses') to be explored and all the tumours in all six levels must be destroyed before the game is completed. To speed up this process two players can simultaneously zap the Brucies, but you'll be hard pushed to find a friend to play who stays your friend!

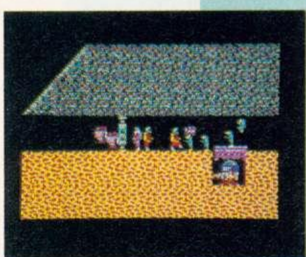
You gain an extra life after every 25,000 vitality points, but that's only if you don't get bored before then. I did, because *Crisis* is very primitive. The satisfaction of shooting Bruce is the only thing going for the game, and as you can imagine, even this method of passing the time is quickly exhausted.

Sam Greenhill



If you've ever wanted to 'zap' Bruce Forsyth then this game's for you

OUT OF EXILE





And if you're still stuck in Exile, here's one last chance to get you out

If you have been following the *Exile* series over the past few Iissues of *BAU*, there is a distinct possibility you may have actually finished the game.

On the other hand you might still be on instruction (52), and frankly, I wouldn't blame you. Well, for those of you who might be in that situation, and for other *Exile* fans, I have a nice little offering for you this month. It comes from the super-hot processor of Jonathan Hart, an *Exile* fan and avid Game Show reader.

The *Exile Editor* can be found in the yellow pages, if you like typing in, and on the monthly disc if you don't. Jonathan's application edits *Exile* files (around the ragged rock!...) in almost any way possible. Perhaps the most striking feature is its ability to fill up your pockets with *any* item – destinators, pink chests, blue robots, monkeys, frogs, and even a carbon copy of yourself! Four 'shadow' clones of yourself can pop out and mimic your every move. Great for attacking Harry the stripy robot with. He won't know what has hit him!

There are two programs to type in – the main editor, called *Edit*, and a loader called *Ed*. If you want to start from scratch then chain *Edit*, load in a pre-saved datafile (this can be anything, as long as it was saved from within *Exile*), change a few settings and save the file to your own disc. Then boot up *Exile* in the normal way and load in the file. If you are already playing *Exile* and you hit SHIFT-f9 to save the game, followed by a CTRL-BREAK. Then, instead of loading the *Exile* supervisor, chain *Ed* and the data will be retained. It's quite simple.

With the Editor, you can also set your energy to any level and any weapon to infinite power, which is rather handy in some situations, and generally mess about with the settings. One useful feature is an all-purpose destruction 'smart bomb' utility which can be turned on, but not off. Once on, and as soon as the game is loaded, just about everything on the screen self-destructs, including switches, doors, wasps – in fact, everything but you and the walls around.

Due to the structure of the game you may find that objects off the screen sort of 'die' as well. This is because the *Exile* game holds them all in a stack of memory, with the most recent object it comes across displacing the oldest. To avoid unwanted damage, make sure you fire a few rounds of bullets to clear out the stack before you save your game position. I think you'll find it fun.

This marks the end of the *Exile* series, and if you still can't complete the game after all this help, I'm sorry, but there is no hope for you. I suggest you see a doctor!

● Meanwhile, a monthly disc containing the *Exile Editor* will be sent to the first person to tell me Jonathan's favourite music group! Clues do exist. Answers on a postcard or the back of an envelope to: Exile Editor Competition, Game Show, *BBC Acorn User*, 20-26 Brunswick Place, London N1 6DJ. The closing date is Friday April 5 1991.

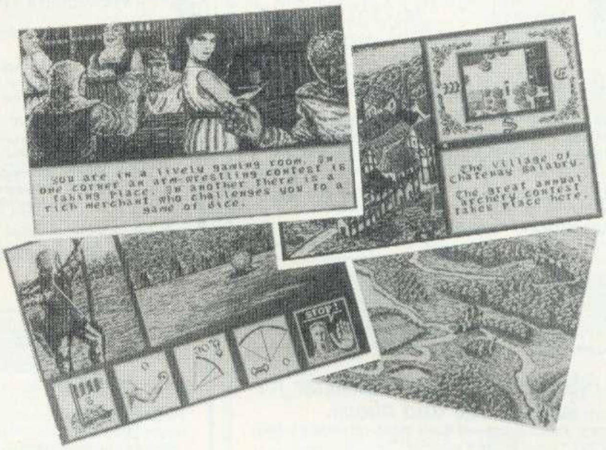
NOT SUCH A FOOL...

It's not fair. Every year I intend writing an April Fools joke into this column. Ever since I was fooled by the 'Zarch-on-the-Beeb' gag in 1987 I've wanted to express my revenge in some way. Ah well, maybe next year ...

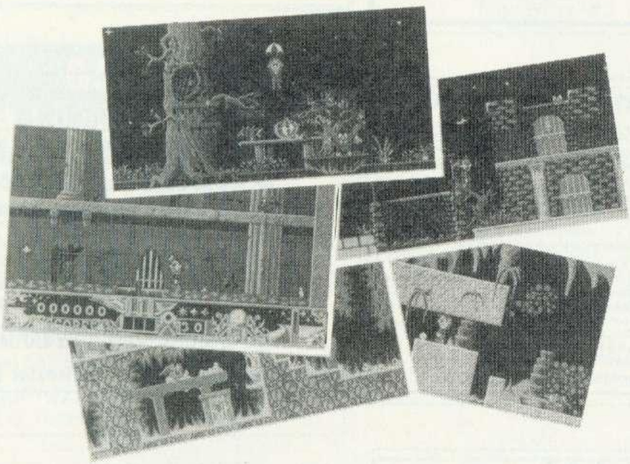
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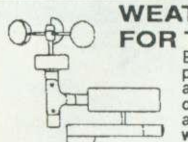
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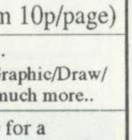
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ACORN USER ADVERTISEMENT PAGES - APRIL 1991

RIDING THE STORM

The Arc has helped one company to improve maritime navigation – and detect fish. **MAXINE McCOY** reports

Sailing is a practised art. A life on the ocean wave may sound idyllic, but the sea can be a cruel taskmaster – which is why modern ships are hi-tech, complex machines.

For prospective sea captains, initial training on dry land is essential. Just as computers are used in flight simulations to introduce pilots to the controls and movement of aircraft, so navigational training aids can help with shiphandling techniques and familiarisation with radar systems.

A range of navigational aids, based on Archimedes computers, have been developed by South Wales company, Maritime Dynamics, to help improve sea-going efficiency and safety.

Pat Cleary, who manages the company, explained: 'When we were deciding on which type of computer to use for these applications, a number of considerations influenced our decision. The cost/performance ratio needed to be very high and the operating system had to suit the applications, and be straightforward to network. It also had to offer high graphics performance.'

So far, the company has not been disappointed with its choice.

Training colleges can specify the type of vessel simulation they require, but Maritime Dynamics already has an impressive list. Users can set up instructor and up to four student consoles, called 'own ships', which simulate a veritable flotilla of ships, from tankers to fast attack craft.

The instructor console acts as the central controlling station and has the necessary displays, controls and communications equipment, along with printing and plotting facilities. Each student console has a control panel, a steering stand for manual practice, a radar facility, navigational aids, a visual system and communications equipment – just as in a real ship.

ARC-AIDS

Archimedes computers are used in three main areas: radar, navigational aids and the visual system. They also enable a mathematical modelling suite to be used for calculating motion, speed, depth, current and wind force.

Both real radars and a synthesised raster-scan radar can be interfaced to the company's Coastline Generator, essential for each student ship. This is made up of an Archimedes, linked by Ethernet to the main network, which has a high standard of radar picture presentation and includes vital information about sea and precipitation clutter, mutual radar interference, shadowing and target aspects.

As each operating system is separate, one ship can be involved in offshore collision work, while another carries out close approach work in a port area. Alternatively, all ships can work from the same database and act as mutual targets.



TYPICAL SHIP LAYOUT WITH VISARS 3 SCREEN DISPLAY

Maritime Dynamics has exploited the growing need for greater realism in simulated navigational aids, again using the Archimedes. Navaids, as they're called in the trade, come in three types: synthetic, realistic and the real thing. The company can provide all the usual aids, plus satellite navigation and echo sounding.

Synthetic navaids are controlled via a keyboard and chosen from a menu, and the appropriate information is then presented on screen. In a realistic set-up, the correct controls and display are simulated, while a real simulation involves actual navaids, interfaced to a signal generator. However, the nearer to reality required, the higher the cost.

Navigational training also involves 'keeping a good lookout', combining the view from the bridge windows with the plan view and radar display. Computer generated imagery (CGI) is provided according to requirements. The most simple visual system, Visars, has three channels covering up to 150 degrees horizontally, showing shore features, target ships and lights.

Maritime Dynamics' *pièce de resistance* is Visars 3, which gives a full daylight CGI scene with an update rate of one-six frames per second. The system is again based on an Archimedes and a high resolution display, for which any number of channels can be provided, using either VDUs or RGB projection.

MORE FISH TO FRY

Meanwhile, the future for Maritime Dynamics' Arc-based systems looks healthy. They are currently being used in Sydney Harbour and for port design and arctic research in Canada. Plans are also in progress for fishing simulators. Echo sounders, track plotters and sonars will give apprentice fishermen the ability to trace even the most slippery and elusive of fish – and net them.

Who knows? The fish lying next to your chips may well have been caught with a little help from the Arc...

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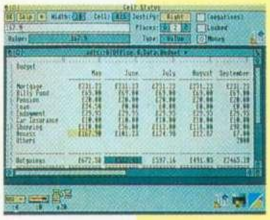
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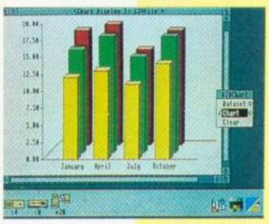
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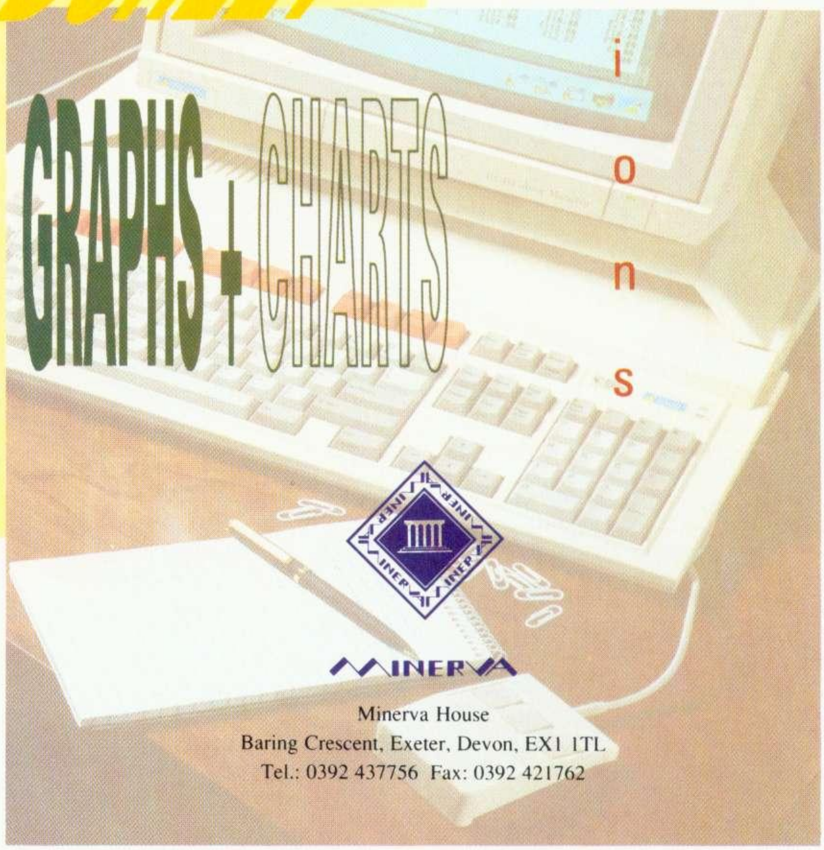


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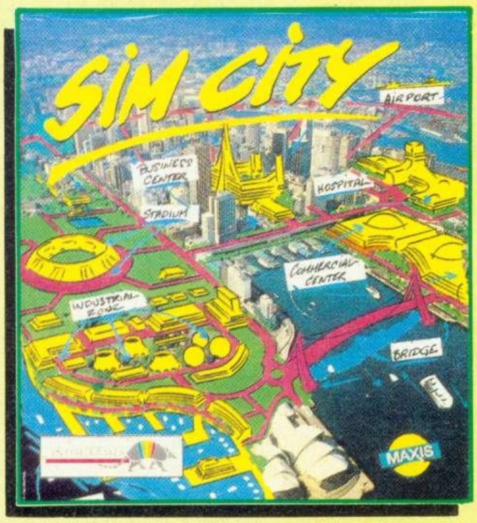
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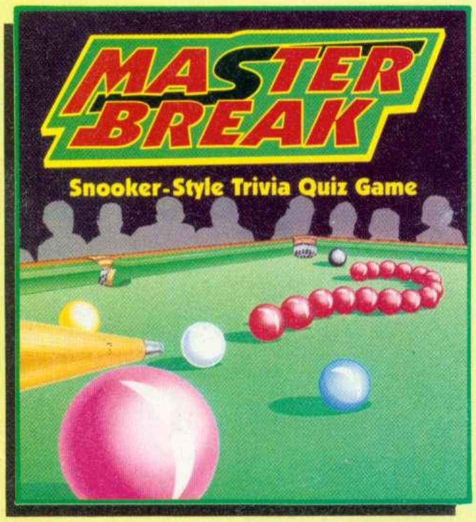
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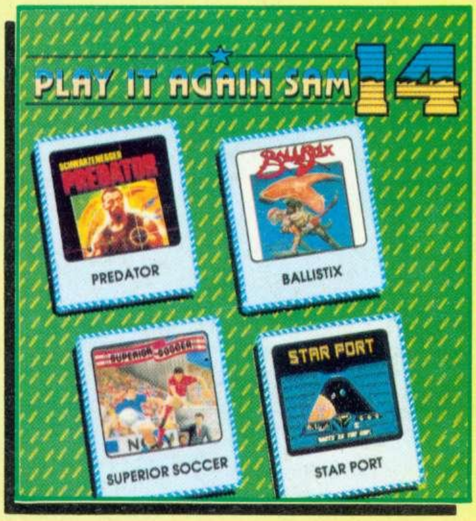


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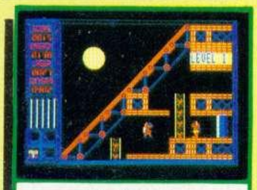
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